VOLUME 27 JUNE 1934 NUMBER 6

Southern Medical Journal

Journal of the Southern Medical Association

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Entered as Second-Class Matter at the Post Office at Birmingham, Ala., under act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Sec. 1103, act of October 3, 1917, authorized Dec. 20, 1921.

Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16

TABLE OF CONTENTS

Referred Abdominal Symptoms in Pulmonary Tuberculosis. Lawrason Brown, Saranac Lake, New York 473
Discussed by C. H. Cocke, Asheville, N. C.

Some Notes on Referred Digestive Symptoms. Thomas R. Brown, Baltimore, Maryland 481

Abdominal Symptoms of Cardiovascular Disorders. John T. King, Jr., Baltimore, Maryland 486

Emotional and Nervous Factors in Symptoms of Abdominal Disease. W. W. Young, Atlanta, Georgia 490

Ulcerative Colitis: I. The Relationship Between Bacillary Dysentery and Ulcerative Colitis. Thomas T. Mackie and Mary S. B. Gaillard, New York, New York 492
Discussed by G. R. Callender, Fort Sam Houston, Tex.

The Mechanism of Production of Curling's Ulcer. Robert Kapsinow, Lafayette, Louisiana 500
Discussed by Louis Levy, New Orleans, La.; A. A. Herold, Shreveport, La.

A Clinical Investigation of Incidence of Rheumatic Heart Disease in a Subtropical Climate. E. W. Bitzer and Geo. L. Cook, Tampa, Florida 503
Discussed by C. C. McLean, Birmingham, Ala.

Continued on Next Page

ATKINSON'S

"EXTERNAL DISEASES OF THE EYE"

This new book confines itself to the external diseases of the eye, or to those ophthalmic conditions in which a tentative diagnosis may be made without the use of the ophthalmoscope. Therapeutic procedures are presented clearly and concisely. The book is abundantly illustrated and the engravings are quite as valuable as the text itself in clarifying the author's ideas.

By Donald T. Atkinson, M.D., Consulting Ophthalmologist to the Santa Rosa Infirmary and the Nix Hospital, San Antonio, Texas. Octavo of 704 pages, 479 illustrations.

Cloth, $7.50

Send Orders To

J. A. MAJORS COMPANY

NEW ORLEANS DALLAS

TABLE OF CONTENTS—Concluded

Pneumococcic Peritonitis. John H. Lyons, Washington, District of Columbia 507

Discussed by William B. Marbury, Washington, D. C.; Joseph T. Buxton, Newport News, Va.

The Management of Fractures of Both Bones of the Leg. Randolph L. Anderson, Charleston, West Virginia 513

Discussed by W. K. West, Oklahoma City, Okla.; John E. Cannaday, Charleston, West Va.; H. Earle Conwell, Fairfield, Ala.

Rural Health Organization in the United States: Past, Present and Future. Allen W. Freeman, Baltimore, Maryland 517

The Stone Age of Surgery. Logan Clendening, Kansas City, Missouri 521

The Leukocytes in Skin Diseases. H. H. Hazen, Washington, District of Columbia 527

Discussed by Raymond Kimbrough, Norfolk, Va.; Howard Fox, New York, N. Y.

The Principal Hay Fever Plants and Pollens of the South. Hal M. Davison and Mason I. Lowance, Atlanta, Georgia; and O. C. Durham, Chicago, Illinois 529

Swelling of the Orbit with Especial Reference to Cavernous Sinus Thrombosis. Cuthbert Tunstall, Charlottesville, Virginia 535

Discussed by M. M. Cullom, Nashville, Tenn.; Homer Dupuy, New Orleans, La.; John H. Foster, Houston, Tex.

A Case of Normal Associated Lateral and Also Dissociated Ocular Movements. J. Warren White, Norfolk, Virginia 539

Repeated Neonatal Deaths from Impetigo Neonatorum. M. Pierce Rucker, Richmond, Virginia 540

Intraligamentous Pregnancy at Term: Report of Two Cases. H. H. Ware, Jr., Richmond, Virginia 540

Discussed by Edward Speidel, Louisville, Ky.

Satisfactory Treatment of Some Forms of Resistant Tinea Infection. H. R. Cogburn, Mobile, Alabama 543

A Case of Unilateral Clubbing of the Fingers. Groesbeck Walsh and R. H. Alldredge, Fairfield, Alabama 545

SYMPOSIUM ON MALARIA—Part 2

Results of Recent Research in the Treatment of Malaria. Charles F. Craig, New Orleans, Louisiana 546

Observations on Winter Infection Rates in A. Maculipennis and A. Superpictus in Bulgaria. K. Drensky and R. K. Collins, New York, New York 549

Statistics of Malaria Prevalence. Stewart G. Thompson, Jacksonville, Florida; J. George Dempsey, New Orleans, Louisiana; and Butler Toombs, Atlanta, Georgia 552

Results from Screening of Rural Homes in Lake County, Tennessee. Henry E. Meleney and James A. Crabtree, Nashville, Tennessee 552

Discussed by George E. Riley, Jackson, Miss.; H. A. Johnson, Memphis, Tenn.

Helping the Minnows. M. A. Fort, Bainbridge, Georgia 558

EDITORIALS 562

Cause of Acute Rheumatic Fever
Response to Insulin
Gleanings from Recent Journals
Twenty-Five Years Ago

SAN ANTONIO—WHERE WE MEET 565

BOOK REVIEWS 567

SOUTHERN MEDICAL NEWS 568

UNIVERSITY of MARYLAND, SCHOOL of MEDICINE and COLLEGE of PHYSICIANS and SURGEONS

Requirements for Admission—Two years of college work, including English, Chemistry, Biology, Physics and one year in a modern foreign language, in addition to an approved four year high school course.

Facilities for Teaching—Abundant laboratory space and equipment. Two large general hospitals absolutely controlled by the faculty and several hospitals devoted to specialties, in which clinical teaching is done.

For catalogue apply to **J. M. H. Rowland, M. D., Dean, N. E. Cor. Lombard and Greene Streets, Baltimore, Md.**

LIPPINCOTT BOOKS

INTERNATIONAL CLINICS

Edited by LOUIS HAMMAN, M.D.
Visiting Physician, Johns Hopkins Hospital, Baltimore, Md.

With the Collaboration of

FRANCIS GILMAN BLAKE, M.D.
Yale University, New Haven, Conn.
ARTHUR L. BLOOMFIELD, M.D.
Stanford University, San Francisco, Calif.
VERNON C. DAVID, M.D.
Rush Medical College, Chicago, Ill.
CAMPBELL P. HOWARD, M.D.
McGill University, Montreal, Canada
DEAN LEWIS, M.D.
Johns Hopkins University, Baltimore, Md.
W. McKIM MARRIOTT, M.D.
Washington University School of Medicine, St. Louis, Mo.
JOHN W. McNEE, M.D.
University College Hospital, London, Eng.
GEORGE RICHARDS MINOT, M.D.
Harvard University, Boston, Mass.
JOHN H. MUSSER, M.D.
Tulane University, New Orleans, La.
CHARLES C. NORRIS, M.D.
University of Pennsylvania, Philadelphia, Pa.
WALTER W. PALMER, M.D.
Columbia University, New York, N. Y.
E. REHN, M.D.
University of Freiburg, Germany
PASTEUR VALLERY-RADOT, M.D.
University of France, Paris, France
RUSSELL M. WILDER, M.D.
The Mayo Foundation, Rochester, Minn.

And written by leading members of the profession throughout the world.

The easiest and cheapest way to have all the new things while they are new from the big leaders.

Every subscriber has the privilege of personal consultation with the Pittsburgh Diagnostic Clinic on two cases, which are included in each issue.

Four cloth bound octavo volumes. 300 pages each. Fully illustrated in colors, black and white. $3.00 each. Issued in March, June, September and December.

"This quarterly, in the reviewer's opinion, grows progressively more and more indispensable to the practitioner of medicine. The subject matter combines a splendid grasp of the content dealt with in both its scientific and clinical aspects. This issue is replete with matter of much importance. A good index concludes the volume."—New Orleans Med. & Surg. Jl., Nov. 1933.

The International Clinics is fortunate in adding a valuable new feature for its 1934 subscribers without any additional cost. Arrangements have been completed through which each volume will carry two diagnostic problems which have actually been handled by the Pittsburgh Diagnostic Clinic, an institution manned by the highest-grade physicians in Pittsburgh.

This gives every subscriber to the International Clinics real actual post-graduate study at home. With his inquiries of two cases submitted with each number of the International Clinics (eight in a year), answered by one of the outstanding institutions in the country (Pittsburgh Diagnostic Clinic), and with this added feature of extraordinary merit, every doctor should be a subscriber to International Clinics at a total cost of only $1 a month.

J. B. LIPPINCOTT COMPANY

LONDON Since 1875 — 16 John St., Adelphi
PHILADELPHIA Since 1792 — East Washington Square
MONTREAL Since 1897 — Confederation Bldg.

Please send me:

☐ INTERNATIONAL CLINICS ... $12.00

Name .....
Street .....
Town ..... State .....

Southern Medical Journal

another new Mosby book!

SPINAL ANESTHESIA - - - Vehrs

By George Rudolph Vehrs
Salem, Oregon

269 Pages

81 Illus.

Price, $5.50

The wide adoption of spinal analgesia by larger and more important hospitals and clinics has created a demand for a volume correlating well-known and proved facts on this subject. This book constitutes a survey of the experimental and clinical records in the field of spinal anesthesia. With almost 70% of the surgery of today being done under spinal anesthesia there is a real need for this new book.

TUBERCULOSIS IN THE CHILD AND ADULT . . . . . Pottenger

A discussion of pathologic anatomy, pathologic physiology, immunology, diagnosis and treatment of tuberculosis. By Francis M. Pottenger, Monrovia, Calif. 600 pages, 85 Illus. Price, $8.50.

DISEASES OF CORONARY ARTERIES . . . . . Sutton & Lueth

Covers symptomatology, physical examination, anatomy, pathology, physiology, pharmacology and treatment. By Don C. Sutton and Harold Lueth, Chicago. 164 Pages, 42 Illus. Price, $5.00.

INJURIES OF THE EYE . . . Wurdemann

Covers the diagnosis, treatment, forensic procedures and visual economics of injuries of the eye. By Harry V. Wurdemann, Seattle, Wash. 917 Pages, 235 Illus. Price, $13.50.

SURGERY OF THE STOMACH AND DUODENUM . . . . . Horsley

Fully describes the method of technique for operative procedures on stomach and duodenum. By J. Shelton Horsley, Richmond, Va. 260 Pages, 136 Illus. Price, $7.50.

MANAGEMENT OF FRACTURES, DISLOCATIONS AND SPRAINS— . . . . . Key & Conwell

Clearly illustrates many new and approved methods of treatment of fractures, picturing step by step operative procedures. By J. A. Key, St. Louis, and H. Earle Conwell, Birmingham, Ala. 1208 Pages, 1165 Illus. Price, $15.00.

BUY NOW ON EASY PAYMENT PLAN

These books can be purchased on our Convenient Monthly Payment Plan. A first payment of as little as $3.00 will put any of these books or journals in your office.

SMJ—Je—34

THE C. V. MOSBY CO.,
3525 Pine Blvd.,
St. Louis, Mo.

Gentlemen: Send me the following.....

.....

.....

charging my account.

Dr.....

Address.....

Special Journals

Journal of Allergy—Published bi-monthly. $7.50 a year.

Journal of Laboratory and Clinical Medicine—Published monthly. $8.50 a year.

Journal of Pediatrics—Published monthly. $8.50 a year.

American Journal of Syphilis and Neurology—Published quarterly. $10.00 a year.

American Heart Journal—Published bi-monthly. $7.50 a year.

Journal of Thoracic Surgery—Published bi-monthly. $7.50 a year.

American Journal of Obstetrics and Gynecology—Published monthly. $8.50 a year.

NOW...Rabies Vaccine in Concentrated Doses

25% more brain and spinal-cord tissue in each dose and only one-fourth the volume! This is the new concentrated form of rabies vaccine—Mulford Rabies Vaccine (Human).

This improved, concentrated vaccine in an improved, smaller syringe means greater convenience for the physician and less pain at the site of injection for the patient. The superiority of the smaller dose is apparent when considering that 14 or 21 doses are administered within a 10- to 14-day period.

The new Rabies Vaccine Mulford is a ½-cc. dose containing a 25% sterile suspension of brain and spinal-cord tissue of rabbits moribund from the injection of a fixed strain of rabies. It is a killed vaccine. The amount and strength of vaccine are identical in each dose.

The new package is available for either the 14-dose or 21-dose treatment.

The new ½-cc. concentrated Rabies Vaccine Mulford in comparison to the old 2-cc. syringe. 25% more tissue vaccine and one-fourth the volume.

MULFORD BIOLOGICAL LABORATORIES

Sharp & Dohme

PHILADELPHIA BALTIMORE MONTREAL

Rabies Vaccine Mulford

A new era in the treatment of

MALARIA

The advent of Atabrine has been termed a new era in the treatment of malaria by a number of investigators in this field. An appraisal of the results obtained with this new agent demonstrates its superiority over the customary quinine medication. Briefly summarized the advantages of the new method are:

(1) The short duration of treatment required. *Five days' administration is usually sufficient;* in rare instances not more than a week.

(2) Atabrine destroys both the schizonts (asexual parasites) and the gametes (sexual parasites). In estivo-autumnal malaria, it should be followed by a course of Plasmochin in small doses.

(3) In most instances the schizonts cannot be detected in the blood on the fourth day. The gametes disappear on the fifth day.

(4) This is accomplished without the unpleasant after-effects of quinine such as headache, tinnitus, vertigo and deafness.

(5) Atabrine can be given when blackwater fever is present. It is not contraindicated during pregnancy.

DOSAGE: Adults, one tablet three times daily for 5 successive days. Children, one-half to one tablet, once to thrice daily according to age.

Pamphlet containing detailed information will be sent to physicians on request.

NRA WE DO OUR PART U.S.

ATABRINE

Reg. U.S. Pat. Off.

(*Pronounced At'a-breen*)

Brand of Chinacrin

Supplied in tablets of 0.1 Gm. (1½ grains), with groove for division, in tubes of 15.

WINTHROP CHEMICAL COMPANY, Inc., NEW YORK, N. Y.

320M

ELI LILLY AND COMPANY

FOUNDED *1876*

Makers of Medicinal Products

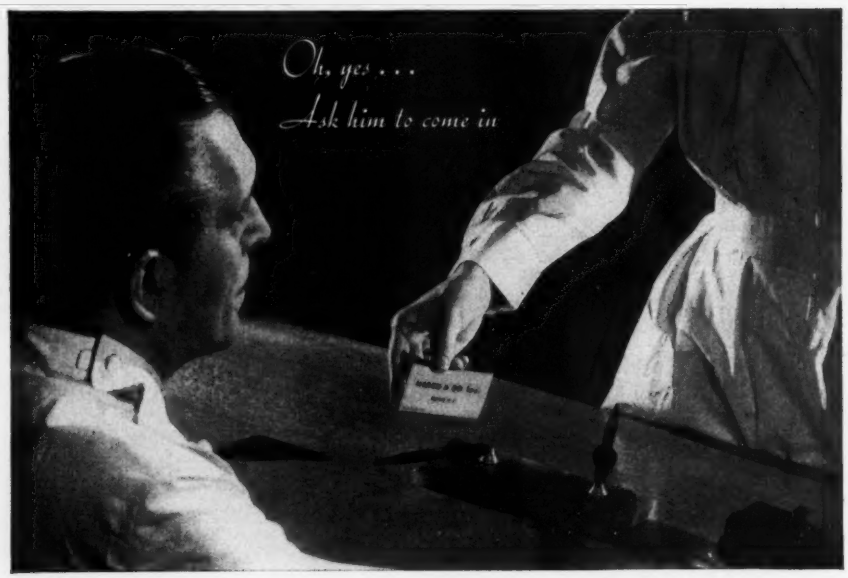
MERTHIOLATE, LILLY

A number of the conditions involved in tissue antisepsis which limit the usefulness of many active germicides seem to be satisfactorily met by Merthiolate, Lilly. This organic mercurial compound —sodium ethyl mercuri thiosalicylate— is effective in water or in the presence of living tissues and is safe for therapeutic use.

Solution Merthiolate, 1:1,000, and Tincture Merthiolate, 1:1,000 (containing harmless coloring matter), are supplied in four-ounce and pint bottles.

Prompt Attention Given to Professional Inquiries

PRINCIPAL OFFICES AND LABORATORIES, INDIANAPOLIS, INDIANA, U.S.A.



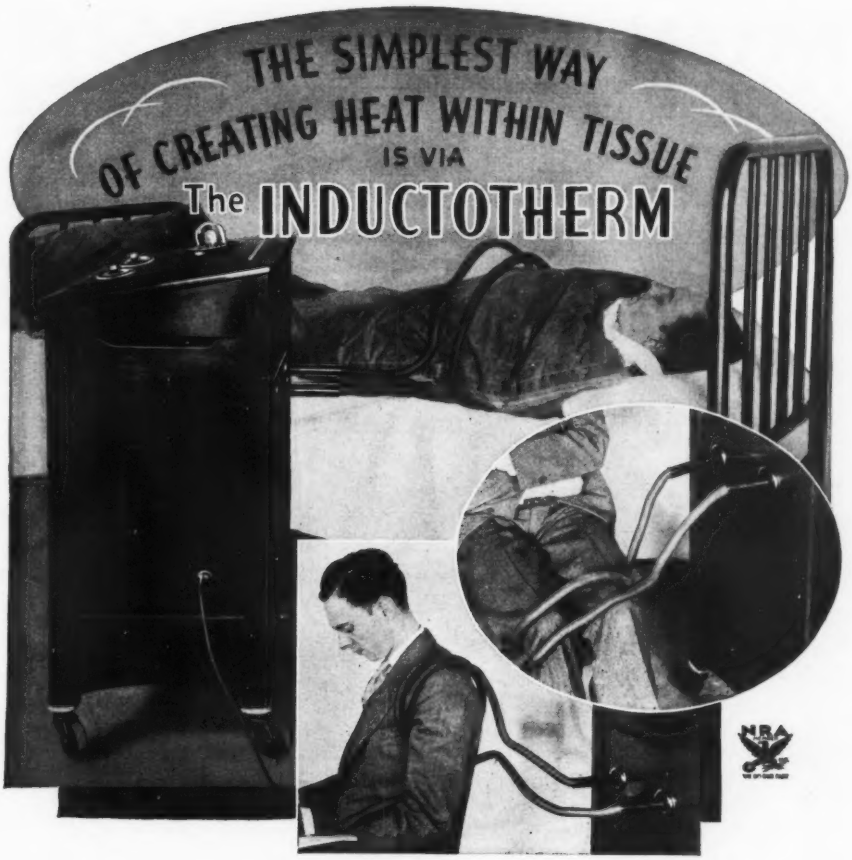
TRADE **PYRIDIUM** MARK

PHENYLAZO-ALPHA-ALPHA-DIAMINO-PYRIDINE MONO-HYDROCHLORIDE. MFD. BY PYRIDIUM CORP., N. Y.

"Good afternoon doctor... are you prescribing Pyridium?"

IN CASE you have never given Pyridium a trial, may we suggest that you do not delay further in taking advantage of its usefulness. It is very valuable for the alleviation of the distressing symptoms that often accompany genito-urinary infections, as well as in the treatment of these infections.

MERCK & CO. INC. • Rahway, N. J.
MANUFACTURING CHEMISTS



COMPARED with every other known method of introducing heat to the deeper tissues in any part of the body, the Inductotherm is remarkably simple.

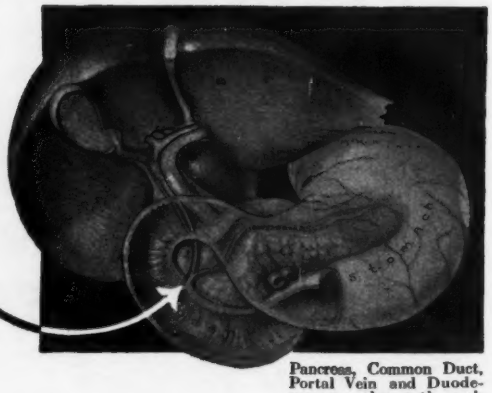
So-called body (skin-contact) electrodes are not required with the Inductotherm. Superseding them is a flexible insulated cable (see illustration), which is simply coiled around the part in which heat is desired, or around the entire body for fever therapy. Thus the minimum time is required in preparing the patient.

The Inductotherm is a vacuum tube oscillator which generates an alternating current of 12,000,000 cycles per second. The magnetic field within the cable produces eddy currents and a resulting heat within the tissues — dominantly in the vascular tissues, and to the exclusion of neuro-muscular response.

So simple — so convenient — so efficient — this G-E development will prove its value in every field of therapeutics where internal heat is indicated.

GENERAL ELECTRIC X-RAY CORPORATION
2012 JACKSON BLVD. *Branches in Principal Cities* CHICAGO, ILLINOIS

WHEN THE TROUBLE is HERE



Pancreas, Common Duct, Portal Vein and Duodenum are shown through the phantom Stomach.

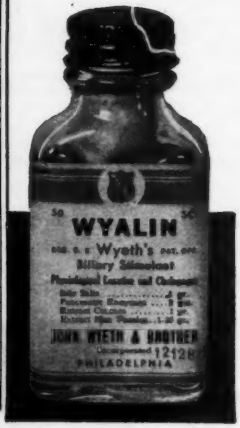
Rx

WYALIN

BILIARY stasis, either of liver or of gall-bladder or bile duct origin, is associated with some stasis of the pancreatic duct.

The result is that the duodenum receives insufficient enzymes for digestion and insufficient bile for maintaining peristalsis and assisting in fat digestion.

WYALIN is indicated in these upper intestinal disturbances because it stimulates the *secretion* of bile, supplies pancreatic enzymes, stimulates the secretion of gastric juice, and increases bowel tonus. WYALIN **contains no phenolphthalein.**



JOHN WYETH & BROTHER, Inc.

Philadelphia, Pa. and Walkerville, Ont.

SAINT ALBANS SANATORIUM

RADFORD, VA.

Medical Staff:
J. C. KING, M.D.
JAMES KING, M.D.

A modern, ethical Institution, fully equipped for the diagnosis, care and treatment of medical neurological, mild mental and addiction cases. Ideal location, 2000 feet above sea level. Rates reasonable. Railway facilities excellent. Write for full details.

The Wyatt-Hicks Streptococcus Antigen

For Intravenous Use
In The Treatment Of
Chronic Infectious Arthritis

A combination of a streptococcus vaccine and a polyvalent soluble antigen for protective immunity and desensitization.

THE WYATT CLINIC
RESEARCH LABORATORIES
TUCSON, ARIZONA

The Tulane University of Louisiana

GRADUATE SCHOOL OF MEDICINE

Postgraduate instruction offered in all branches of medicine. Courses leading to a higher degree have also been instituted.

A bulletin furnishing detailed information may be obtained upon application to the

DEAN
GRADUATE SCHOOL OF MEDICINE
1430 Tulane Avenue
New Orleans, Louisiana

Grace Lutheran Sanatorium
FOR TUBERCULOSIS

SAN ANTONIO, TEXAS

ADMITS patients irrespective of religion or creed. An attractive institution in beautiful San Antonio. Climate unexcelled the year round for treatment of tuberculosis. Private rooms with bath and sleeping porch; individual cottages; high-class accommodations; Radiographic and Fluoroscopic service. Every room and cottage equipped with radio.

MODERATE RATES

For booklet and information address

REV. PAUL F. HEIN, D. D., Superintendent
P. O. Box 214 San Antonio, Texas

WESTBROOK SANATORIUM

Richmond *Virginia*

Telephone—Boulevard 1220

Department for Men:
J. K. Hall, M.D.
O. B. Darden, M.D.

Department for Women:
P. V. Anderson, M.D.
J. H. Royster, M.D.
E. H. Alderman, M.D.

The institution is situated just beyond the northern border of the city on the Richmond-Washington automobile highway.

The scope of the work of the Sanatorium is limited to the diagnosis and the treatment of nervous and mental disorders and to the addictions to drugs and to alcohol. It affords also adequate facilities for rest and upbuilding under medical and nursing supervision.

The medical staff devotes its entire attention to the patients in the Sanatorium.

The institution maintains a school for trained attendants in which instruction in the care of the nervous and mentally sick is emphasized.

There are twelve separate buildings for patients, with 150 beds. Such a large group of buildings makes possible the more congenial grouping of patients. Rooms may be had single or en suite, with or without private bath. There are a few small cottages for the use of individual patients.

A comprehensive general physical and nervous examination is made of each patient. A mental examination is made when indicated. The examination is typed and a copy of it is available for the referring physician. Complete x-ray equipment has been installed. A dental room has been fitted up and a complete dental investigation is a part of the general survey.

A skilled teacher gives practical daily instruction to small groups in the arts and crafts. Helpful and interesting occupation in the out-of-doors is made possible for the men patients in the vegetable and flower gardens, on the truck farm, in the poultry yards, and in the dairy.

There are bowling, tennis, croquet, and pool. There is a movie and a dance every week. On Sunday evening there is chapel service.

Detailed information is available for physicians.

Brawner's Sanitarium

ATLANTA, GEORGIA

For Mental and Nervous Diseases

A modern neuropsychiatric hospital with special laboratory facilities for the study and treatment of early cases. Also a department for the treatment of drug and alcoholic addictions.

The Sanitarium is located on the Marietta Electric Car Line ten miles from the center of Atlanta, near Smyrna, Georgia. The grounds comprise 80 acres. The buildings are steam heated, electrically lighted, and many rooms have private baths.

Address communications to Brawner's Sanitarium, Smyrna, Georgia, or to the city office, 478 Peachtree Street, Atlanta, Georgia.

Dr. Jas. N. Brawner, Medical Director.
Dr. Albert F. Brawner, Resident Physician.

ARLINGTON HEIGHTS SANITARIUM

P. O. BOX 978, FORT WORTH, TEXAS

For Nervous Diseases and Selected Cases of Mental Diseases

(Incorporated under laws of Texas)

BRUCE ALLISON, M.D.
Superintendent

JAS. D. BOZEMAN, M.D.
Resident Physician

DRS. D. L. ALLISON and JNO. S. TURNER
Consultants

McGUIRE CLINIC

ST. LUKE'S HOSPITAL

Richmond, Virginia

. . . Medical and Surgical Staff . . .

General Medicine:
James H. Smith, M.D.
Hunter H. McGuire, M.D.
Margaret Nolting, M.D.
John Powell Williams, M.D.
Kinloch Nelson, M.D.
Clifford H. Beach, M.D.

Orthopedic Surgery:
William T. Graham, M.D.
D. M. Faulkner, M.D.
J. T. Tucker, M.D.

General Surgery:
Stuart McGuire, M.D.
W. Lowndes Peple, M.D.
Carrington Williams, M.D.
W. P. Barnes, M.D.

Pathology and Radiology:
S. W. Budd, M.D.

Roentgenology:
J. L. Tabb, M.D.

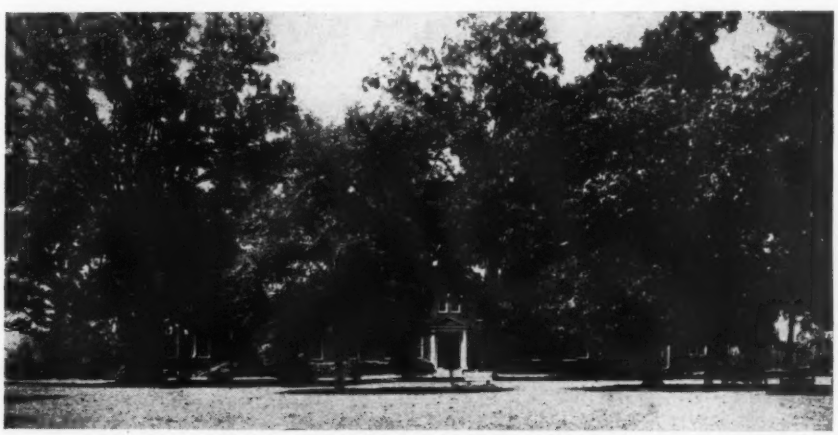
Obstetrics:
H. Hudnall Ware, Jr., M.D.

Urology:
Austin I. Dodson, M.D.

Eye, Ear, Nose and Throat:
F. H. Lee, M.D.

Dental Surgery:
John Bell Williams, D.D.S.
Guy R. Harrison, D.D.S.

WALTER R. WALLACE, M.D. HUGH W. PRIDDY, M.D.



THE WALLACE SANITARIUM

MEMPHIS, TENN.

For the treatment of Drug Addiction, Alcoholism, Mental and Nervous Diseases. Fully equipped for the care of patients admitted. Sixteen acres of beautiful grounds. Located in the eastern suburbs of the city at Southern Ave. and Cherry Road.

St. Elizabeth's Hospital

RICHMOND, VIRGINIA

Staff

J. Shelton Horsley, M.D., Surgery and Gynecology
John S. Horsley, Jr., M.D., Plastic and General Surgery
Guy W. Horsley, M.D., General Surgery
Douglas G. Chapman, M.D., Internal Medicine
Wm. H. Higgins, M.D., Consultant in Internal Medicine
Austin I. Dodson, M.D., Urology
Fred M. Hodges, M.D., Roentgenology
Thos. W. Wood, D.D.S., Dental Surgery
Helen Lorraine, Medical Illustration

Assistant Attending Staff

Harry J. Warthen, Jr., M.D., Surgery
W. K. Dix, M.D., Internal Medicine
J. P. Baker, Jr., M.D., Internal Medicine
Marshall P. Gordon, Jr., M.D., Urology

Administration

N. E. Pate ..... Business Manager

SCHOOL FOR NURSES

The Training School is affiliated with **Johns Hopkins Hospital** in Baltimore for a three months' course each, in Pediatrics and Obstetrics. All applicants must be graduates of a high school or have the equivalent education.

Address: DIRECTOR OF NURSING EDUCATION

THE TUCKER SANATORIUM, INC.

212 West Franklin St. (Corner of Madison)

RICHMOND, VIRGINIA

This is the Private Sanatorium for the Neurological Practice of Drs. Beverley R. Tucker, Howard R. Masters and James Asa Shield.

The Tucker Sanatorium is for the treatment of nervous and endocrine diseases. There are departments of massage, medicinal exercises, hydrotherapy and physiotherapy. The Sanatorium is large and bright, surrounded by a lawn and shady walks, large verandas and has a roof garden. It is situated in the best part of Richmond and is thoroughly and modernly equipped. The nurses are specially trained in the care of nervous cases.

Insane and acute alcoholic cases are not taken.

CITY VIEW SANITARIUM

For MENTAL and NERVOUS DISEASES and ADDICTIONS

ESTABLISHED IN 1907
AN ENTIRELY NEW PLANT ERECTED IN 1922

Separate buildings for men and women, ideally arranged and equipped with every facility for the comfort, care and treatment of the class of patients received. Situated in the midst of a fifty-acre tract, and surrounded by large groves and attractive lawns. Two resident physicians. Training school for nurses.

References: The Medical Profession of Nashville

JOHN W. STEVENS, M.D., Physician-in-Charge

NASHVILLE **R. F. D. No. 1** **TENNESSEE**

On Murfreesboro Pike, one-half mile east of old location

STUART CIRCLE HOSPITAL

Richmond, Va.

Medicine:
ALEXANDER G. BROWN, JR., M.D.
MANFRED CALL, M.D.
MANFRED CALL, III, M.D.

Surgery:
ROBERT C. BRYAN, M.D.
STUART N. MICHAUX, M.D.
CHARLES R. ROBINS, M.D.
A. STEPHEN GRAHAM, M.D.

Obstetrics:
GREER BAUGHMAN, M.D.
BEN H. GRAY, M.D.
WM. DURWOOD SUGGS, M.D.

Ophthalmology, Otolaryngology:
CLIFTON M. MILLER, M.D.
R. H. WRIGHT, M.D.
W. L. MASON, M.D.

Urological Surgery:
JOSEPH F. GEISINGER, M.D.

Oral Surgery:
GUY R. HARRISON, D.D.S.

Pathology:
REGENA BECK, M.D.

Physiotherapy:
ELSA LANGE, B.S.
Technician

Roentgenology and Radiology:
FRED M. HODGES, M.D.
L. O. SNEAD, M.D.

Stuart Circle Hospital was organized and has been operated for twenty years with certain additions and improvements affording scientific care to patients in General Medicine, Surgery, Obstetrics and the various medical and surgical specialties. Detailed information furnished physicians.

CHARLOTTE PFEIFFER, R.N., Superintendent

DR. MOODY'S SANITARIUM

SAN ANTONIO, TEXAS

315 Brackenridge Avenue **Phone Fannin 5522**

For Nervous and Mental Diseases, Drug and Alcohol Addiction and Nervous Invalids Needing Rest and Recuperation

Established 1903. Strictly ethical. Location delightful summer and winter. Approved diagnostic and therapeutic methods. Seven buildings, each with separate lawns, each featuring a small separate sanitarium, affording wholesome restfulness and recreation, in doors and out doors, tactful nursing and homelike comforts.

G. H. Moody, M.D.
Founder

J. A. McINTOSH, M.D., F.A.C.P.
Superintendent

The Pottenger Sanatorium and Clinic

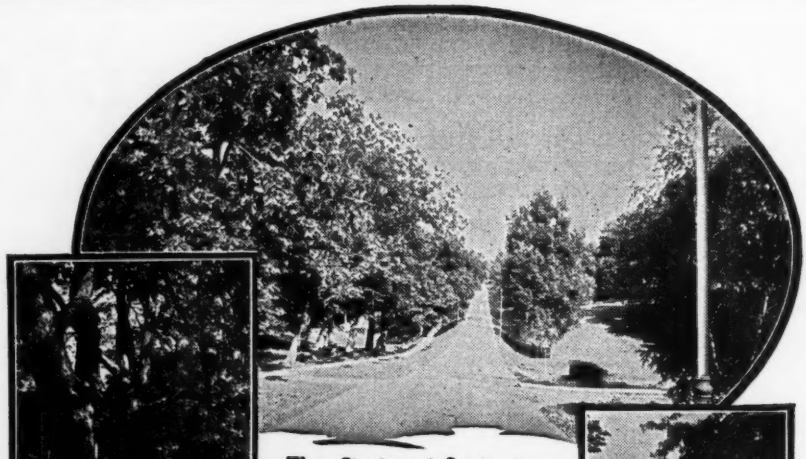
For Diseases of the Chest
MONROVIA, CALIFORNIA

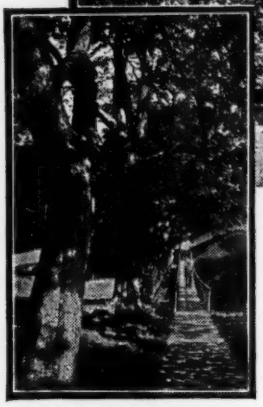
For the diagnosis and treatment of all forms of tuberculosis, and other diseases of the chest such as asthma, lung abscess and bronchiectasis.

Located in the foothills of the Sierra Madre Mountains, 16 miles east of Los Angeles, in a beautiful subtropical park. Patients can live in the open air in comfort throughout the year. Close personal attention given each patient. Full staff in residence. Reached via the main line of the Santa Fe, and the interurban electric system. Weekly rates from $25, up, including medical attention, medicines (except expensive remedies) and general nursing. Extra charge for operative measures (except pneumothorax).

For particulars address

THE POTTENGER SANATORIUM AND CLINIC
Monrovia, California
Los Angeles Office: 1930 Wilshire Boulevard





The Cincinnati Sanitarium

Inc. 1873

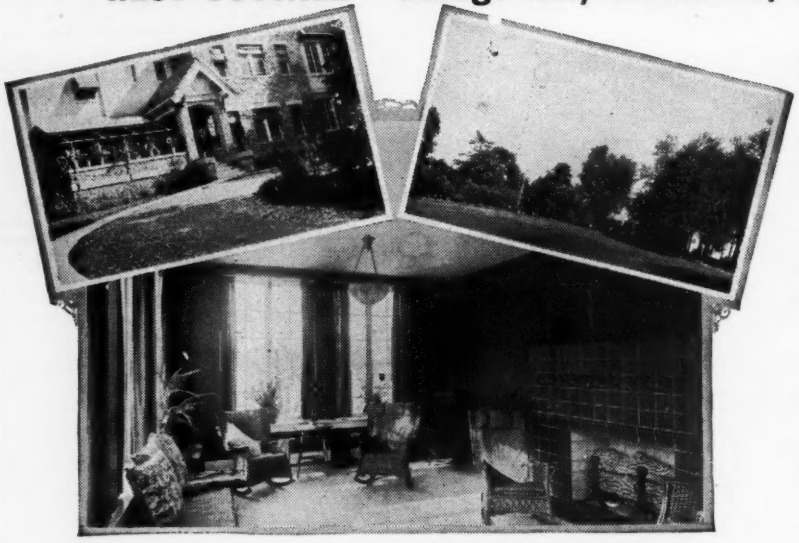
For Mental and Nervous Diseases

A strictly modern hospital fully equipped for the scientific treatment of nervous and mental affections. Situation retired and accessible. For details write for descriptive pamphlet.

Emerson A. North, M.D.,
Charles Kiely, M.D.,
Visiting Consultants
D. A. Johnston, M.D.,
Medical Director

H. P. COLLINS, Business Manager
Box No. 4, College Hill
CINCINNATI, OHIO

"REST COTTAGE" College Hill, Cincinnati, Ohio



For purely nervous cases, nutritional errors and convalescents.

Completely equipped for hydrotherapy, massages, etc.

Cuisine to meet individual needs.

Emerson A. North, M.D.
Charles Kiely, M.D.
Visiting Consultants

D. A. Johnston, M.D., Medical Director

H. P. Collins, Bus. Mgr., Box No. 4, College Hill, Cincinnati, Ohio.

HILL CREST SANITARIUM

FOR NERVOUS AND MENTAL DISEASES AND ADDICTIONS

Established in 1925

A NEW HOSPITAL HAS BEEN ERECTED

Thoroughly modern in architecture and construction. Eight departments—affording proper classification of patients. All outside rooms, attractively furnished. Several bathrooms and rooms with private bath on each floor. Also a spacious sun parlor in each department. Located on the crest of Higdon Hill, 1050 feet above sea level, overlooking the city, and surrounded by an expanse of beautiful woodland. Ample provision made for diversion and helpful occupation. Adequate night and day nursing service maintained.

JAMES A. BECTON, M.D., Physician-in-Charge

P. O. Box 96, Woodlawn Station, Birmingham, Ala. Phones: 9-1151 and 9-1152

Consultants: C. M. Rudulph, M.D.; H. S. Ward, M.D.

WAUKESHA SPRINGS SANITARIUM

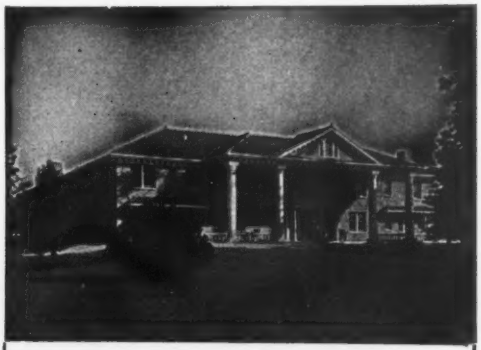
For the Care and Treatment of

NERVOUS DISEASES

Building Absolutely Fireproof

BYRON M. CAPLES, M.D., Medical Director
FLOYD W. APLIN, M.D.

Waukesha, - - - Wisconsin



The Oxford Retreat

Oxford, Ohio

FOR

NERVOUS
AND
MILD MENTAL CASES

R. HARVEY COOK
Physician in Chief

Write for Descriptive Circular

Seven Years' Use has demonstrated the value of the

SURGICAL SOLUTION of

Mercurochrome H.W. & D.

in Preoperative Skin Disinfection

THIS preparation contains 2% Mercurochrome in aqueous-alcohol-acetone solution and has the advantages that:

Application is not painful.
It dries quickly.
The color is due to Mercurochrome and shows how thoroughly this antiseptic agent has been applied.
Stock solutions do not deteriorate.

Now available in 4, 8, and 16 oz. bottles and in special bulk package for hospitals.

Literature on request

This seal denotes acceptance of Mercurochrome for New and Nonofficial Remedies by the Council on Pharmacy and Chemistry of the American Medical Association.

AMERICAN MEDICAL ASSOC.

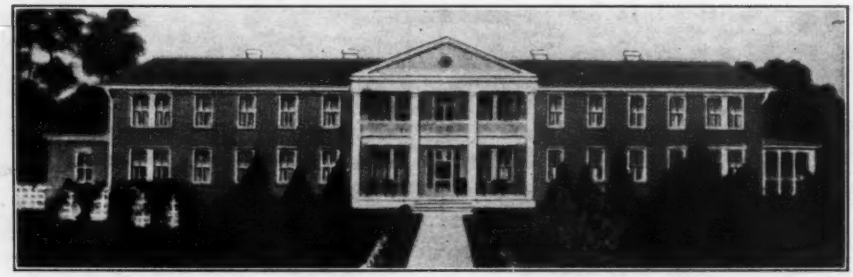
Hynson, Westcott & Dunning, Inc.

BALTIMORE, MARYLAND

THE NEW FENWICK SANITARIUM, COVINGTON, LA.

Over 41 Years of Successful Operation

QUALITY



SERVICE

MAIN BUILDING

For Mild Mental and Nervous Diseases, Drug and Liquor Addictions and Infirmities of Old Age.

The Sanitarium Buildings are new and of pressed brick, steel and concrete construction. They are located on well kept grounds with lawns, shrubs, and shade trees. Equipped with steam heat, fire protection and all modern conveniences for the scientific care and treatment of these cases. Each case is individual and given personal care and attention. All patietns are given thorough examination and all newer methods of diagnosis used, such as, the chemistry of the blood, spinal fluid, secretion and excretions of the body—our clinical laboratory is complete and operated by trained technicians. Also complete Basal Metabolism outfit. A quiet and refined atmosphere pervades this institution. Rest and Quiet are cardinal features. A trained staff of physicians, all members of the American Medical Association. Sanitarium is registered by the A. M. A. and is member of the American and State Hospital Associations. Dr. F. F. Young, Manager and Physician-in-Chief.

We are in the center of the Ozone Belt, less than two hours from New Orleans

SOUTHERN MEDICAL JOURNAL

JOURNAL OF THE SOUTHERN MEDICAL ASSOCIATION

PUBLISHED MONTHLY BY THE SOUTHERN MEDICAL ASSOCIATION AT BIRMINGHAM, ALA.

Volume 27 JUNE 1934 Number 6

REFERRED ABDOMINAL SYMPTOMS IN PULMONARY TUBERCULOSIS*

By LAWRASON BROWN, M.D.,
Saranac Lake, New York

INTRODUCTION

At the beginning of my talk may I recall to you some statements, possibly facts, concerning pulmonary tuberculosis. It is common, except in infants, a chronic disease. Even when acute, it is generally grafted upon a previous infection long present. It is usually stated that the average duration of pulmonary tuberculosis is five years, meaning that that is the time which elapses from the recognition of what have been called the early symptoms until death. It is again highly probable that the disease has existed in the lungs of many of these patients for a much longer time than the symptoms would indicate. The poisons of the tubercle bacillus have been thought to have a special affinity for nerve tissue. However this may be, the psychic and nervous organization of the individual is frequently profoundly affected when he is told that he has pulmonary tuberculosis. It is usually the first information that has come to him suggesting that his span of life may be briefer than he had anticipated. Even to the phlegmatic this is somewhat jarring. So every patient, it has seemed to me, is at some time a bit neurasthenic. Tuberculosis is no respector of persons or rather is the arch enemy of the ambitious, who frequently indulge in overwork while carrying about with them a nervous system hung upon a hair trigger. With apparently blasted ambition, the patient is subjected to hours, to days, to months, of inactivity, of regret, and while upset in this way, he is urged, encouraged, many times cajoled into putting into an unsettled, a squeamish stomach, food that possibly he has avoided for one reason or another much of his life. We focus attention upon the stomach, and those prone to neuroses or psychoneuroses develop abdominal symptoms. It is not surprising then that some suffer from referred abdominal symptoms, but rather that more do not; for food is the keystone of the therapeutic arch over which the patient infers he must pass to recovery. As the stomach, so the pulmonary lesion! He is informed that he must eat or to put it blankly, he will die! This, when recalled at meal times, is not conducive to normal digestion.

While tuberculous ulceration of the stomach is very rare and peptic ulcer no more frequent than in other chronic diseases, intestinal tuberculosis is the most frequent complication of pulmonary tuberculosis at autopsy. Only in the last decade and a half have we known when in the course of the disease it arose. It apparently produces symptoms long attributed to and considered peculiar to the pulmonary lesion. Many of these have of course to do with the digestive tract and when they occur it is highly important to know whether a definite organic lesion is present. Indeed, no patient with moderately or far advanced pulmonary tuberculosis can be considered to be thoroughly examined until his intestinal tract has been explored roentgenologically. I do not stress a similar examination of the stomach, for that is usually performed when necessary.

The digestive disturbances are apparently independent of the extent of the pulmonary lesions and may be the sole symptom of an early pulmonary tuberculosis. The pre-tuberculous dyspepsia, formerly so frequently described, is now recognized as an early stage of the tuberculosis. Often more pronounced, more continuous in the presence of an elevated temperature and general weakness, they may overshadow the pulmonary symptoms during much of the course of the tuberculosis.

*Read in Joint Session, Section on Medicine and Section on Gastroenterology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

HISTORICAL NOTE

The association of abdominal symptoms with pulmonary tuberculosis has long been noted. Hippocrates drew attention to it and Richard Morton in 1689 stated that vomiting in connection with cough was held to be a pathognomonic sign of phthisis. For over a century we have had careful postmortem observations upon the subject. Even if some of P. C. A. Louis' autopsy notes on the stomach confused postmortem with antemortem changes, his observation of diarrhea in patients with an apparently intact bowel cannot be impugned. This observation has been repeatedly confirmed from that day to this (by Austin Flint and others). In 1805, Baumes described a "gastric" phthisis and in 1821 Wilson Phillips introduced the term "dyspeptic" phthisis. Vulpian somewhat later is said to have stated that the dyspeptic symptoms decreased or even disappeared as the pulmonary tuberculosis advanced, which others have confirmed. Bourdon, in 1852, again held that the dyspeptic symptoms preceded the pulmonary tuberculosis. As early as 1854, irritation of the vagus was advanced as the cause of many of these symptoms. In 1853, Hughes Bennett stated as his belief that dyspepsia in the consumptive was associated with the poor digestion of fats, which was later confirmed by Jonathan Hutchinson. Edward Smith called attention to the fact that dislike of fats was more common in tuberculosis than in other diseases. Fenwick noted this in 64 per cent of his patients, and as late as 1927 Vaile remarked upon the difference in the number of the fat-eating and fat-shy individuals in 24 families embracing 164 persons, who developed pulmonary tuberculosis; less than 4 per cent of the fat-eating and over 78 per cent of the fat-shy became tuberculous. In 1888, changes in the chemical composition of the secretions were suggested as the cause of the abdominal symptoms and the following year Brieger, Hildebrandt and others began a series of observations, the end of which is not yet in sight. Confusion still commands the situation.

Such observations are what we have to draw upon from the literature and while interesting they often fail to record the stage of the pulmonary tuberculosis. I know of no observations, up to this time, save those of Erickson's, which have been based on cases studied roentgenologically. Certainly all the symptoms described by the older writers as occurring in late, advanced or terminal stages of pulmonary tuberculosis must be disregarded, for we know now that from 50 to 80 per cent of all such patients suffer from intestinal tuberculosis.

FREQUENCY

The importance of any group of symptoms is usually directly proportional to their frequency and to the influence they exert upon the measures remedial for the disease. No one denies the frequency of abdominal symptoms in pulmonary tuberculosis. "All the tuberculous," says Grancher, "have been, are or will be dyspeptic." Few escape these symptoms, whether suffering from acute or chronic types of tuberculosis, and widely known internists have been misled even after the occurrence of a brisk hemoptysis on account of the predominance of the gastric and the absence or paucity of the pulmonary symptoms. Women are, I think, more prone to such symptoms than men, an interesting observation when the swallowing of sputum is taken into consideration for women are notoriously greater offenders along this line. Bourdon's figures would suggest that these symptoms are more common in the acute types of tuberculosis. He found without apparent cause nausea and vomiting in 30 per cent of 23 males, in 39 per cent of 18 males, all acute cases; and in 9 per cent of 22 males, and in 18 per cent of 16 females among the chronic cases. In 316 patients with pulmonary cavity 135 (42.5 per cent) had dyspepsia, 62 per cent among the women, 25 per cent among the men. When we compare such figures, compiled long before the use of x-rays, with the amount of intestinal tuberculosis in similar patients, 85 per cent, we can see some organic cause for many of the symptoms.

It is of some interest to recall the frequency of abdominal symptoms in pulmonary tuberculosis according to different authors: Jonathan Hutchinson, 92 per cent; Landis, 53 per cent in 3,007 patients; Mohler and Funk, 64.6 per cent in 1,000 patients; Janowski, 35 per cent of 700 patients; Perla, 80 per cent of 198 patients; S. J. Cohen, 20.8 per cent of 1,000 patients.

STUDY OF 400 PATIENTS

Realizing how few studies have been made in regard to the referred abdominal symptoms in patients with pulmonary tuberculosis in whom intestinal tuberculosis had been excluded, I have attempted to analyze some 400 cases at the Trudeau Sanatorium, which included 70 in the minimal, 285 in the moderately advanced, and 45 in the far advanced stage. You will recall that

this classification is based almost entirely upon the pathological changes as inferred from the physical and roentgenological examinations. These patients are further subdivided according to the severity of their symptoms into groups A, B and C. Of these 400 patients only 19 had symptoms severe enough to put them in the B group and none fell into the C group. (One minimal, 10 moderately advanced and 8 far advanced cases were classified as B.) This makes it very clear that only the more favorable types are included in these figures, for the Trudeau Sanatorium excludes as far as possible unfavorable cases, that is, patients for whom little can be done in six months. To collect this group about 700 consecutive records were gone over and all who had definite pulmonary tuberculosis and had been subjected to a roentgenological intestinal examination were chosen seriatim. There were 209 men and 191 women. In only 29 per cent of the group was the appetite poor; the remainder had at all times a good appetite. Of the men 21 per cent (44), of the women 38 per cent (72) suffered some loss of appetite. The stage of the disease in these cases seemed to have a little bearing on the occurrence of indigestion for 60 per cent of the minimals, 48 per cent of the M. A. (moderately advanced), and 47 per cent of the F. A. (far advanced) had such trouble. Of the entire group 47 per cent (187) suffered at some time from indigestion, but only 27 per cent complained of it at the time of the roentgenologic intestinal study. A division into the sexes showed that 47 per cent (98) of the men and 52 per cent (99) of the women had indigestion. At the time of admission, indigestion was present in 28 per cent (58, 54) of both sexes.

Nausea and vomiting, occasionally one of these alone, occurred in 23 per cent of all patients. It was present in 26 per cent of the minimals, 22 per cent of the M. A. and in 26 per cent of the F. A. and in 18 per cent of the men and in 36 per cent of the women. Food preferences were not marked. The majority liked all foods, but some avoided fats.

When studied according to the stage of the disease 42 (60 per cent) of the 70 minimal cases all without cavity suffered from indigestion at

Table 1

RELATION OF APPETITE, INDIGESTION, NAUSEA AND VOMITING TO STAGE OF DISEASE AND SEX

	Indigestion	Symptoms	Minimal			Moderately Advanced			Far Advanced		
			Total	Male	Female	Total	Male	Female	Total	Male	Female
Appetite good	Previous	A	14	9	5	34	21	13	9	6	3
Nausea and vomiting			5	1	4	7	4	3	5	3	2
Appetite poor			8	1	7	17	4	13	1	0	1
Nausea and vomiting			3	1	2	9	7	2	0	0	0
Appetite good	On Admission	A	10	7	3	51	25	26	6	4	2
Nausea and vomiting			3	1	2	16	3	13	2	1	1
Appetite poor			10	5	5	29	13	16	2	2	0
Nausea and vomiting			6	2	4	14	4	10	1	1	0
Appetite good	None	A	21	14	7	113	66	47	14	8	6
Nausea and vomiting			0	0	0	9	2	7	0	0	0
Appetite poor			6	3	3	31	10	21	5	3	2
Nausea and vomiting			1	0	1	6	1	5	0	0	0
Appetite good		B	1		1	6	2	4	5	3	2
Nausea and vomiting			0			0	0	0	4	3	1
Appetite poor						4	2	2	3	1	2
Nausea and vomiting						1	0	1	0	0	0

One female patient, Min. B., appetite good, no indigestion, nausea or vomiting. Omitted from table.

Table 2

RELATION OF INDIGESTION TO PULMONARY CAVITY AND TUBERCLE BACILLI IN SPUTUM

		TB	Cavity		Indigestion			
			+	0	None	Pres.	Prev.	On Adm.
Minimal 70	A	+		31	13	18	7	11
		0		38	14	24	15	9
	B	0		1	1			
				70	28	42	22	20
Moderately Advanced 285	A	+	38		26	12	7	5
				175	90	85	32	53
		0	28		27	1		1
				34	1	33	12	21
			66	209	144	131	51	80
	B	+	5		2	3		3
				4	4			
		0		1	1			
			5	5	7	3	0	3
Far Advanced 45	A	+	24		12	12	7	5
				8	5	3		3
		0		5	2	3	3	
	B	+	8		5	3	2	1
			32	13	24	21	12	9
400			103	297	203	197	85	112

some time; 134 (47 per cent) of 285 moderately advanced had indigestion (118, or 55 per cent of 214 without cavity); 16 (23 per cent) of 71 with cavity; while for the 45 far advanced, the presence of cavity seemed of little moment and 24 (53 per cent) had indigestion. Of all the group 284 (71 per cent) had a good appetite and of them 18 per cent had at some time nausea and vomiting. On the other hand, of the 116 with a poor appetite, 35 per cent had nausea and vomiting. When a patient had indigestion (191), nausea and vomiting was over four times as frequent (37 per cent) as when there was no indigestion (190 patients and 16, or 8 per cent, with nausea and vomiting). The relation of sex to the occurrence of indigestion, nausea and vomiting and to appetite is shown in *Table 3,* expressed in percentages.

In this table the pertinent facts stand out clearly. Males have a better appetite than females and suffer less from nausea and vomiting. Indigestion is slightly more common among the females, and when present increases in both sexes the likelihood of nausea and vomiting.

The relation of the presence of cavity and of tubercle bacilli to the occurrence of indigestion is of interest. Of the 400 patients, 293 had tubercle bacilli at some time in the sputum and of them 157 (54 per cent) had at some time indigestion. Of the 107 patients without tubercle bacilli at any time, 61 (57 per cent) had suffered at some time from indigestion. Hence it is fair to infer that the presence of tubercle bacilli *per se* has little influence upon the occurrence of indigestion. Of the 400 patients, 103 had a pulmonary cavity and of these 31 (30 per cent) had indigestion, while in 297 without cavity 166 (57 per cent) had this symptom. Apparently patients with pulmonary cavity suffered less from indigestion, a fact which, if correct, is difficult of explanation. When both cavity and tubercle bacilli were present (75 patients) indigestion occurred in 30 (40 per cent), while when both were absent (83 patients), indigestion occurred in 60 (72 per cent). Is it possible that referred abdominal symptoms brought these patients earlier to the physician? Indigestion was present in 197 patients (49 per cent), in 85 (21 per cent) before and in 112 (28 per cent) at the time of admission or of roentgenologic study of the intestine.

DISCUSSION OF ABDOMINAL SYMPTOMS

The referred abdominal symptoms that occur frequently in pulmonary tuberculosis are those listed in most text-books under the head of "nervous dyspepsia." They include among others change in, usually loss, of appetite, not always associated with fever; epigastric or substernal distress, heaviness or fullness after meals; more or less actual pain; nausea from time to time, resulting in some cases in vomiting; and a further list attributed to the intestinal tract, such as distention, flatulence, increased

Table 3

RELATION OF SEX TO INDIGESTION, NAUSEA, VOMITING AND APPETITE EXPRESSED IN PERCENTAGES

	Indigestion	Appetite		Nausea and Vomiting
Males 197	+	G	77	18
	47	P	23	71
	0	G	84	2
	53	P	16	6
Females 180	+	G	55	48
	52	P	45	45
	0	G	69	12
	48	P	31	23

flatus, constipation (due in part to the enforced inactivity) and diarrhea.

Attention has already been called to the fact that intestinal tuberculosis is the most frequent complication of pulmonary tuberculosis, occurring rarely in the minimal stage of the disease, not uncommonly in the moderately advanced and very frequently in the far advanced and terminal stages. This complication can occur without any discoverable symptoms or produce any of the symptoms described under the head of dyspepsia. No discussion of referred abdominal symptoms in pulmonary tuberculosis can be intelligently handled or is indeed worth considering until intestinal tuberculosis has been excluded in the cases upon which it is based. Several years ago, at my suggestion, R. J. Erickson studied very carefully 40 patients in whom intestinal tuberculosis had been excluded roentgenologically and compared them with 100 in whom intestinal tuberculosis existed. A compilation of the figures in regard to the symptoms at onset in these two groups is shown in *Table 4*.

Table 4

TYPES OF ONSET IN PERCENTAGES

	Without Intestinal Tuberculosis	With Intestinal Tuberculosis
Insidious	62.5	34
Diarrhea	12.5	16
Pain	17.0	25
Nausea and vomiting	7.5	8
General digestive disturbances	15.0	3
Fever	2.5	5
Many symptoms		4

Among the striking facts brought out in this table is the difference in the occurrence of the insidious onset in those with (34 per cent) and those without (62.5 per cent) intestinal tuberculosis. Pain at the onset was found more frequently in those with general digestive disturbances, more often in those without the complication. During the course of the pulmonary tuberculosis, cramping mild pain anywhere in the abdomen is common, but when complicated with intestinal tuberculosis the pain is more often severe and confined to the right lower quadrant. Diarrhea occurs in less than one-half of the patients and constipation in one-tenth, while the figures for intestinal tuberculosis are diarrhea in two-thirds and constipation in more than one-fourth. Moderate or slight digestive disturbances were slightly more common among the cases without intestinal tuberculosis than among the cases with it. Distress or fullness after eating were about equally frequent in the two groups (25 and 28 per cent), while disturbances of appetite and "sour" stomach were more common in patients with the intestinal complication. It seems hardly necessary to remind you that the symptoms were also more severe in this group. Persistent diarrhea as a rule is not found in the patients without intestinal tuberculosis.

The appetite in pulmonary tuberculosis is often capricious, fickle. The patient may experience a feeling of hunger until the first mouthful is taken and then nausea supervenes. Others may eat a little when they become nauseated and if they persist in eating more they vomit it all. Anorexia may begin early in the disease and persist to the end, but many of these patients have always been poor eaters. Again anorexia may dominate the picture and continue after the disease becomes quiescent. Fever may not affect the appetite, which some think is of significance in differential diagnosis (Lasegne). Bulimia has been noted and at times I have wondered whether fear of prolonging the "cure" was not instrumental in bringing it about. The dietary habits before the onset of the pulmonary tuberculosis have much to do with those followed during the course of the disease. Poor eaters usually remain poor, while large eaters apparently waste much good food. The condition of the digestion during the pulmonary tuberculosis reflects more or less closely what it was before the onset of the tuberculosis. If a dyspeptic, who Lindsay thinks has no more chance of contracting pulmonary tuberculosis than a healthy man, does develop the disease, he usually remains a dyspeptic.

You may recall that Goldthwaite divided mankind into three groups according to their bodily configuration; the long, slim, carnivorous type; the heavy, beefy, herbivorous type; and the rare normal type, pictured in treatises on anatomy and in many paintings. According to Goldthwaite, the carnivorous type has a much shorter bowel and is more prone, I think, to digestive disturbances when he contracts pulmonary tuberculosis. However, this is only an expression of opinion based on the shifting sands of memory.

It may be of interest to recall that some years ago in Trudeau gastroptosis was "discovered" in many such patients and much significance attributed to it in connection with referred abdominal symptoms until further experience showed what was well known elsewhere, namely: that a stomach practically in the pelvis could

function normally. Some unfortunate patients, as soon as a diagnosis of tuberculosis is made, are of course never again allowed to have an appetite, for they are crammed with lunches day in and day out.

Among the referred symptoms flatulence is probably the most common, and I often tell patients that unless they have an excess of gas in the abdomen they must have something wrong with them! Acidity is also very common. Constipation is usual during treatment, whether due to general muscular weakness, inactivity or sedatives. A small number of patients are unduly subject to diarrhea from slight causes such as unsuitable food, slight chilling, especially of the abdomen at night and more frequently during hot weather. It is possible, of course, that these conditions are connected indirectly with the tuberculosis.

Vomiting is frequently associated with cough, though why this should accompany pulmonary tuberculosis and pertussis frequently and be less commonly found in other diseases with chronic cough is difficult to explain. It has seemed to me that even in some weakened patients the persistent cough has resulted in a development of the abdominal muscles out of all proportion to the other body muscles. Such disproportionate development might make vomiting more easily brought on and consequently more frequent. In later stages of the pulmonary tuberculosis it more often follows nausea. Vomiting is said at times to precede all other symptoms, especially in women, but I have not noted such a case.

SUGGESTED CAUSES OF REFERRED ABDOMINAL SYMPTOMS

It is always easier to describe symptoms than to trace them to their ultimate cause. He who attempts to explain how certain remedies or methods work is treading upon boggy and treacherous ground. So it is with the explanation of many of the symptoms under discussion. My first foolish step might be an attempt to classify the causes of the abdominal symptoms in pulmonary tuberculosis.

(1) Organic lesions in the gastro-intestinal tract.

(2) Functional, referred lesions due to the tuberculous and associated poisons
  (a) Effect on secretions, directly or indirectly.
  (b) Effect on muscles resulting in changes in
    Motility [increased (spasm), decreased]
    Size
    Shape
    Position
  (c) Effect on nerves
    (a) Vagus
    (b) Sympathetic
    (c) Intercostals (diaphragmatic pleurisy)

Changes in the character and amount of the digestive juices as well as in the motility and position of certain organs have been given as the causes, but in a certain number of patients not small in figures, as far as can be determined, these juices remain unchanged in the face of very definite symptoms. The same is true in regard to position and motility. Such changes, however brought about, are undoubtedly the cause of a certain number.

Irritation of the vagus has been pressed into service. Many years ago Fenwick failed to find any gross involvement of this nerve in 100 patients with pulmonary tuberculosis. The tracheobronchial lymph nodes apparently rarely press upon it. Irritation of the terminations of this nerve in the lungs by the lesions of the disease may render the nerve more sensitive to normal stimulation and some would have us believe that such conditions may explain some of the abdominal symptoms common in pulmonary tuberculosis. Vomiting following cough, they recall, is more frequent in pulmonary tuberculosis than in any other respiratory disease save pertussis. The patient coughs, they suggest, because he eats and vomits because he coughs. Cough following a meal is, I believe, more easily accounted for by the increased secretion in the bronchi following the intake of fluids, often warm or hot.

A constitutional dyscrasia cannot escape our dragnet and some consider it the cause of both the tuberculosis and dyspepsia.

Attention is directed by some to the asthenia common in the more advanced and not infrequent in the earlier stages of pulmonary tuberculosis. They suggest that the same condition may be present in the involuntary muscles of the digestive tract.

But none of these explanations is entirely satisfactory and I should like to add to the confusion by suggesting still another. I have wondered whether some of these problems might be due to hypersensitiveness of the mucosa of the stomach and intestine. Every patient with tuberculosis swallows, consciously or unconsciously, while awake or drowsing, more or less sputum nearly every day. Funk and Mohler found tubercle bacilli in the fasting stomach contents in 18 of 24 patients. The work of Ornstein and his associates, not yet confirmed

so far as I know, suggests that even in patients who deny that they have any sputum, tubercle bacilli are found in the gastric contents in 10 to 20 per cent. So the disintegration products of tissue and the tuberculous poisons find ready access to the cells lining the digestive tube. Now the mucous membranes of the stomach and intestines are often found at autopsy to show small cell infiltration. This, some think, is not confined to these organs, but occurs also in the liver, kidney, pancreas and possibly elsewhere. It is of interest to recall the work of Long and Pinner, who perfused the kidneys of tuberculous swine with tuberculous proteins and produced in this way what might be called a "tuberculin" glomerulonephritis, which did not occur in non-tuberculous animals. The lesions acted much like tuberculin reactions in other organs. Gardner has stated that such a reaction might be the cause of the small cell infiltration which he and others have found, as I have mentioned, in the stomach and intestines.

It is possible of course for such antigens to reach these organs by way of the blood stream. However this may be, digestive upsets are common during the onset and early part of an acute flare-up and usually subside as the process tends to become somewhat quiescent. During the development of an acute exudative lesion the patient is more sensitive to tuberculin, more likely to have digestive upsets, and many an occasional unexplained reaction to a slight increase in dosage of tuberculin was later made clear by the appearance of a tuberculous complication. You will recall that some hold that these digestive troubles are more frequent in acute types of tuberculosis. Some may say that they are due to the presence of fever, but fever does not always accompany them.

It has long been noted that the abdominal symptoms may decrease as the patient becomes worse or develops a cavity. Certainly during this process bacilli and the products of their metabolism, as well as the disintegration products of the tissue, must enter not only the blood, but certainly in larger quantity the contents of the digestive tube. You will recall that in about two weeks the fever which occurs in these acute upsets often subsides and then or even a little later we may discover by physical signs what has been taking place. Of course the roentgenogram reveals it far sooner. With the disappearance of some of the sensitiveness the general and digestive symptoms seem to decrease or even, as I have said, to disappear.

The rapid disappearance of the abdominal symptoms following the use of the ultraviolet lamp in intestinal tuberculosis, a disappearance occurring long before the intestinal ulcers could possibly heal, seems to me to support such an hypothesis.

If we could duplicate with tuberculin what Rich and his associates have done with a pneumococcus vaccine in animals, namely: if we could greatly decrease the degree of sensitiveness and the subsequent reaction, and by so doing favor recovery from the disease, we might treat the referred abdominal symptoms successfully with tuberculin. But this day is not yet. I am not convinced that high doses of tuberculin given subcutaneously will abolish or even greatly decrease the local reaction, the tissue reaction to tuberculin.

Having advanced so far into the enticing but misty realm of hypothesis, we might take another step and recall that Petroff has suggested that what occurs for the pneumococcus might also be found to be true in the case of the tubercle bacilli, that is, the virulent strain, the "S" type, may create in the body an anti-"S" serum which might change the virulent into the less virulent type of organism, the "R" type. This in turn might act in a similar manner. If this is true the variations in the virulence of the organism may affect the amount of poison given off (and some evidence upholding that suggestion has been obtained), and so produce fluctuations in the presence or degree of the referred abdominal symptoms.

TREATMENT

It would be presumptive for me to say much upon the treatment of the conditions under consideration before such an audience as this. I shall not attempt to do more than recall to you some suggestions that I have found useful in my own practice. Indigestion, for the reasons that I have mentioned, can often be prevented by a little sound advice about the quantity of food necessary to bring about recovery. In explaining the matter to patients I know of no better simile than that of the gasoline engine and too rich a mixture of gasoline. The quantities of good food that have been wasted in the past are astounding and no longer excusable. The frequency of intestinal tuberculosis is apparently diminishing in Saranac Lake. The only reason that I can adduce for this is the more frequent use of large doses of vitamins (A, C, D). Cod-liver oil and tomato or orange juice, in the proportion of one to three, or again the

use of haliver oil with viosterol with orange or tomato juice furnishes these. It is very easy to use one or the other in all cases of referred abdominal symptoms and the results are at times very gratifying. It is needless to add that such treatment has been found helpful in secondary intestinal tuberculosis. I have prescribed artificial pneumothorax for a girl who I knew would never stop swallowing her sputum as long as any was present. The treatment has proven very successful.

In any patient with moderately or far advanced tuberculosis, the first step in the treatment of these conditions is the exclusion of intestinal tuberculosis by the roentgen examination. It is very interesting that in some the examination alone seems to be helpful. As many of these patients are highly nervous, neurotic if you will, suggestion by word of mouth, reinforced at times by any good medicine (that is, with a good color, a good smell, a good taste and above all perfectly harmless) will bring about recovery in many cases.

A liquid diet without a bite to chew will often restore a lost appetite. In other cases the occasional omission of a meal is helpful. Lunches between meals should of course be given up whenever possible.

The use of Alvarez's smooth diet, of supports in supposed cases of gastroptosis and of the endless medicaments I think we must leave to our gastroenterologist confreres.

SUMMARY AND CONCLUSIONS

(1) This paper is based upon a study of 400 patients with pulmonary tuberculosis in whom intestinal tuberculosis had been excluded.

(2) Failure to exclude the presence of intestinal tuberculosis renders previous studies of referred abdominal symptoms of little value.

(3) The chronicity of pulmonary tuberculosis and the method of its treatment increases the likelihood of the occurrence of referred abdominal symptoms during its course.

(4) In the majority of patients in early stages under proper treatment the referred abdominal symptoms are of little moment.

(5) In the advanced stages of the disease the majority of the patients have intestinal tuberculosis and the symptoms are certainly in part to be attributed to them. This complication of course can exist without any abdominal symptoms whatsoever.

(6) The abdominal symptoms referable to the surgical treatment of pulmonary tuberculosis (artificial pneumothorax, phrenic operation, thoracoplasty) are usually slight, though they may be pronounced and troublesome.

(7) Referred abdominal symptoms are more common during acute types or acute exacerbations of the pulmonary tuberculosis.

(8) The symptoms referable probably to the intestinal tuberculosis are often more pronounced and more persistent than the referred symptoms.

(9) The cause or causes of the referred abdominal symptoms in pulmonary tuberculosis have not yet been definitely determined.

(10) It is very likely that a number of different causes act to bring about these symptoms.

(11) Team work of the gastro-enterologist, roentgenographer and tuberculosis specialist will eventually solve the problem.

(12) A few suggestions regarding treatment are made.

I wish to thank Dr. F. H. Heise and Mr. H. L. Sampson for permission to use some of these statistics.

DISCUSSION (*Abstract*)

Dr. C. H. Cocke, Asheville, N. C.—In his discussion Dr. Brown has excluded abdominal symptoms arising from either demonstrable or unproven but existent abdominal tuberculosis.

In order properly to appreciate the relationship between inflammation in the lungs and altered function in the gastro-intestinal tract (for it is in this altered function that symptoms are expressed) it is well to recall quite briefly the embryological development of the respiratory system from a diverticulum from the gastro-intestinal canal. The respiratory system, therefore, quite obviously carries the same double innervation as the gastro-intestinal canal, to-wit: the vagus nerve of the parasympathetic division of the vegetative system and the inhibiting sympathetics. Inflammation of the lung naturally produces irritation of both of these sets of nerves, with resultant reflex actions; while toxemia may express itself quite markedly peripherally through the sympathetics. The natural result of this latter in the gastro-intestinal system then would be inhibition of both motility and secretion, hence the common finding of hypomotility, hyposecretion and constipation. However, for reflex symptoms to arise as a result of inflammation in any organ, it is well to recall that the stimulus to the nerve must be adequate to produce action and that irritability of nerves is a variable factor in different individuals and in the same person at different times. This is another way of saying, perhaps, how difficult is the diagnosis of functional from organic disturbance. Again, one

cannot omit from his thinking the many variables present in function which may modify symptoms; for example: inherited characteristics, endocrine domination, physicochemical differences and different states of nervous stability or instability.

No adequate comprehension, however, of this broad subject is possible if one overlooks the essential unity of the human organism in an effort to analyze the symptoms referable only to a given system. Also, in evaluating symptoms referable to the gastro-intestinal tract, one must never forget that potentially, at least, if not in very great numbers of instances actually, the tuberculous patient is subject to the same gastro-intestinal complaints and ills arising in any other patient.

The important questions, then, are: first, are the presenting gastro-intestinal disturbances an essential part of his disease, or do they arise from his habits of dietary indiscretions and desire to overcome rapidly the very probably considerable loss of weight? True, the era of overstuffing in tuberculosis is well nigh a thing of the past, so far as the physician's orders are concerned; but we still find zealous members of the family and friends whose insistence on more and more unneeded food leads the patient into dietary indiscretions. This needs only to be known to be corrected.

Second, if the symptoms are a part of the picture of tuberculosis, and not of some intercurrent or previously existing gastro-intestinal disease, do they arise as a result of reflex action, toxemia, or from intestinal tuberculosis?

Here, as Dr. Brown has emphasized, roentgenological studies are invaluable if not always diagnostic. In spite of the difficulties of early diagnosis of gastro-intestinal tuberculosis, the matter is much more hopefully approached now than even a scant dozen years ago. And parenthetically I might add, hopefulness of successful arrest of the intestinal tuberculosis is now also much greater than anyone supposed before the era of sunlight treatment, natural and artificial, and cod-liver oil. The importance of the correctness of diagnosis from the standpoint of treatment, and particularly for the length thereof, is axiomatic; and is, I take it, the burden of Dr. Brown's thesis. To treat for a more or less prolonged period the poor patient already depressed with the knowledge of his pulmonary tuberculosis, who has lost his appetite, has a sense of gastric fullness, with gas and eructations, and probably constipation, on the basis of gastro-intestinal disease, without a realization of the possible psychic, emotional, reflex or toxemic origin of his symptoms is as unfair to him as it is to neglect these if they signify the first evidences of tuberculosis of the intestinal tract.

I can add nothing, I am sure, to Dr. Brown's advice as to how to arrive at the proper decision. I can add my insistence, however, to the oft-repeated plea that the best way to cure these first reflex symptoms is to prevent them by meticulous direction of every detail of the patient's diet, by calming his emotional strife, relieving, if possible, his natural depression and discouragement and dispelling his fears.

SOME NOTES ON REFERRED DIGESTIVE SYMPTOMS*

By THOMAS R. BROWN, M.D.,
Baltimore, Maryland

I know of no subject in medicine more interesting than the topic of this symposium, that of referred symptoms: a pathological condition in one organ or system, the symptoms of which, sometimes the entire group of symptoms, are referred elsewhere. Nowhere is this more likely to occur than in the digestive tract. Here diagnosis is inherently difficult and is made doubly so by the tendency of the digestive tract to express disease of other organs or in turn to have the symptoms of its own disease referred elsewhere in the body. Someone has well said: "The digestive tract is a mirror in which may be reflected disease from anywhere else in the body."

What are the causes of this?

In the first place, there is what may be called the anatomical reason, the close proximity of the abdominal viscera to other organs and to each other. The diaphragm is all that separates heart and lungs from stomach, liver and colon. There is the close anatomical relationship of the pelvic organs and the intestines, notably the appendix (which organ incidentally is peculiarly liable to vary in position, sometimes extending deep into the pelvis, sometimes almost to the gallbladder, sometimes far towards the left side, sometimes to the retrocecal region); the very close relationship of certain portions of the urinary tract to the intestine and appendix; and the fact that the space of a hand can cover gallbladder, pylorus, duodenum and the hepatic flexure.

In the second place, symptoms may be brought about through the blood stream: that is, by physical means due to the failing heart with its chronic passive congestion; by chemical means, secondary to metabolic disturbances such as gout or diabetes, or by deficiency in elimination as in nephritis with its retention of various substances; and last of all, by disturbances of infectious or toxic origin in which the products of acute or chronic infection or inflammation

*Read in Joint Session, Section on Medicine and Section on Gastroenterology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

are the cause of the trouble frequently manifesting peculiarly striking symptoms in the digestive tract because of its very rich lymphatic and blood supply and its unusual innervation.

In the third and last place, and most important of all, referred symptoms of neurogenic origin, reflex phenomena through the nervous apparatus, are peculiarly liable to be manifested in this field because of the unique nerve supply of the gastro-intestinal tract and the role it plays in the interpretation of that most important of all symptoms, pain. Notwithstanding the same underlying pathological conditions, there may be very marked variation in its expression both locally and elsewhere due to the stability or lability of the patient, due to the marked variations in response to the same stimuli. For it must never be forgotten that pain is made up of two factors: the local cause and the affectivity of the patient. What may be only a slight discomfort in a stable person may be magnified to an agonizing pain in an unstable individual.

In certain cases of so-called digestive neuroses the psychic factor may be the only one. The condition may be purely psychogenic in origin, mirroring the emotions and often choosing the digestive tract for an expression of its reactions to the outside world. We must remember that although in a sense this tract is autonomous, it is also under the control of the psyche. There is certainly a digestive center in the diencephalon, probably a cerebral center as well, the steady flow of impulses from which spells digestive health, while in variations in this flow we may find the cause of most of the digestive neuroses.

Even in its intrinsic nerve supply, the digestive tract is different from almost any other portion of the body. It is unique in that it has a double supply, in a broad sense antagonistic to each other, the sympathetic and the parasympathetic. This again adds to the difficulty of interpretation of symptoms and is a very potent cause of referred symptoms. Perhaps there is no better conception of the function of this double, and in a sense antagonistic, nervous mechanism than that given by Cannon: the sympathetic system is organized for diffuse discharges of nerve impulses, which is obviously coincident with the discharge of epinephrine into the blood stream, and that it thus probably plays the major role in preserving constancy of the internal environment and in protecting the organism from changes in the external environment. On the other hand, the parasympathetic system, the vagus and the sacral nerves, act entirely differently; for, with their preganglionic fibers ending in or near to the organs which they affect, they are distributed in a manner favorable to separate and discriminating action. Thus it is this latter system that probably plays the major role in producing referred symptoms.

Nevertheless, notwithstanding this conception and an ever-increasing knowledge in this field, the correct interpretation of that most important of all symptoms, pain, is in most cases far from clear, notwithstanding the fact that Hilton wrote more than sixty years ago: "Every pain has its distinct and pregnant significance if we will but carefully search for it."

Does abdominal pain really represent only changes in visceral tonus? Or spasm? Is it a true viscerosensory reflex with the vagus or splanchnic as its centripetal, the cerebrospinal nerve emerging from the chord at the same level, its centrifugal path? Although we know that the abdominal viscera are insensitive to ordinary painful stimulation, are there some true pain fibers in the splanchnic nerves? May pain be due to compression or stretching of the intrinsic nerves or blood vessels? Do the pain nerves in the parietal peritoneum play a definite role in the appreciation and localization of visceral pain?

Until we answer these questions satisfactorily, which is not possible at the present writing, interpretation of pain is extremely difficult. Yet it is upon a proper interpretation of this cardinal symptom that ultimate diagnosis must be based in certain cases, notwithstanding the increasing knowledge which we are getting from laboratory studies of various kinds: chemical, radiological and bacteriological.

And now, remembering the three potential causes of referred symptoms, the anatomic, the circulatory, the nervous, let us briefly touch upon certain expressions of these disturbing phenomena.

The mimicry of digestive syndromes by diseases of the central nervous system, both functional and organic, is so common that a consideration of this alone would take up far more than the time allotted to me. It is worth remembering, however, that with the ever-increasing strain of modern life, the motor, sensory and secretory digestive neuroses, monosymp-

tomatic or polysymptomatic, the symptoms digestive, the cause purely psychic, are increasing tremendously and are usually treated erroneously as digestive problems rather than correctly by psychotherapy and re-education. However, even proper therapy is often unsuccessful because of the insoluble problems presented and the inability to bring about a suitable adjustment to the environment.

One has not time to touch upon the cases of brain tumor with vomiting, not always projectile, as the only symptom for a while; the rare cases of Meniere's disease, long unsuspected because the gastric symptoms are striking; the occasional case of neoplasm of the spine, with classical symptoms of a colonic new growth; the simulation of every digestive syndrome by hysteria; constipation as the striking symptom of a depression; bulimia of a mild manic state; and certain cases of true migraine where the cerebral symptoms are absent and only the gastro-intestinal symptoms present. (Incidentally, we have found in a certain proportion of cases of migraine that there is a striking intolerance to sugar and we have found that a marked restriction of carbohydrates in the diet is often very helpful in lessening the frequency and severity of the attacks, although of course we realize that this treatment is directed to the secondary, not the primary, cause.)

Finally, one should perhaps mention at somewhat greater length the cases of tabes dorsalis where the symptoms are so suggestive of peptic ulcer or gallstone colic that operation has even been frequently performed, an unpardonable error; for if the examination had been thorough, an Argyll-Robertson pupil, an absent knee jerk, or an abnormal gait should have given us the correct diagnosis and avoided such unsound therapy.

Of course, practically all the acute infections have certain gastro-intestinal symptoms, anorexia, discomfort, nausea, and so on, but as a rule the cause of these is easily recognized; if not immediately, within a few days of their onset, and the symptoms are not alarming. But in certain of the infections we meet with very confusing digestive manifestations.

Perhaps one of the most interesting is the considerable number of cases of measles and the few cases of typhoid fever which begin with symptoms exactly simulating those of acute appendicitis. For these operation has frequently been done to the great chagrin of the operator when a normal appendix is found and a rash or other symptoms of the underlying disease appear a few days later.

Even more puzzling are the pictures of the acute abdomen met with in certain cases of central pneumonia and diaphragmatic pleurisy without any pulmonary symptoms. As regards the chronic infections, it is well to remember that in a considerable proportion, possibly one-quarter of the cases of pulmonary tuberculosis, the earliest and sometimes the only symptom for a long period of time, is a functional dyspepsia. Very interesting, also, are the acute abdominal symptoms met with in undulant fever and in acute rheumatic fever; while even an occasional case of mumps may have as its first symptom severe pain in the lower right quadrant. In chronic infectious arthritis it is striking how frequently gastric achylia is the rule, sometimes with, and sometimes without, gastro-intestinal symptoms.

In all the diseases of metabolism, very puzzling abdominal symptoms may be met with in certain cases, as for instance, the acute abdomen suggesting an abdominal catastrophe, met with occasionally in severe diabetic ketosis with intense pain, tenderness, muscular rigidity and leucocytosis, and yet disappearing a few hours after insulin has been given; in chronic gout where achylia is the rule; and in both hyperthyroidism and hypothyroidism.

In the latter, hypothyroidism, we have been singularly interested in a group of cases in which intractable constipation has been the striking symptom, mostly in women in the late forties or early fifties, usually obese, with little or no response to the ordinary treatment for this condition. We have made basal readings in one hundred fifty-six cases of this type. Frequently we have made several readings in the same case. Of these, eighty-two gave readings lower than 10 per cent; and thirty-one, that is, one-fifth of all the cases, a reading of below 20 per cent. It is remarkable how in this latter group of cases the constipation, peculiarly intractable to ordinary forms of treatment was helped by administration of the proper dosage of thyroid extract. That these cases were true, although mild or *forme fruste* cases of true hypothyroidism, was made more probable by the high blood cholesterol readings found. I am quite sure that mild hypothyroidism is much more common than is usually supposed and may

have only this symptom, intractable constipation.

In hyperthyroidism, it is also well to remember that, while as a rule the symptoms are so characteristic as not to be mistaken, there are a few cases in which intractable diarrhea is the early and sometimes the only symptom. Treatment for diarrhea may be unsuccessfully carried on for a long time until finally some symptom elsewhere or a basal reading shows an overactive thyroid. Therapy based on this assumption, rest, Lugol's solution, according to certain observers radiation of the thyroid gland, and possibly operation, are then indicated.

Nothing is more puzzling than the referred gastro-intestinal symptoms in certain diseases of the urinary tract. The ones that have been most interesting to me have been the simulation of gastro-intestinal disease by renal calculus or true ureteral stricture, a rare condition; and occasionally by floating kidney, of peptic ulcer, cholelithiasis or appendicitis.

Acute right-sided pyelitis is common in young children, especially girls, and may be peculiarly difficult to differentiate from appendicitis, especially as the urine may be clear for some time due to the plugging of the ureter on the infected side. Chronic interstitial nephritis, with its anorexia, nausea, achylia and often occult blood in the stool from the superficial gastric or intestinal erosions often met with in this condition, may produce a picture very difficult to differentiate from that of gastric cancer.

Of recent interest are the cases of gastric distention and marked dyspepsia following left phrenicotomy, unquestionably a beautiful and pure example of a true neurogenic syndrome.

In regard to diseases of the blood, it has been quite remarkable how many cases of pernicious anemia have been first regarded as carcinoma of the stomach, because the symptoms were almost entirely gastric and because of the inexplicable phenomenon that many of these cases have x-ray defects which are frequently interpreted as new growth.

Equally interesting is the acute abdomen sometimes met with in purpura and also in certain cases of sickle cell anemia, sometimes in the case of the former leading to operative treatment because of the intensity of the pain in the lower right quadrant of the abdomen. A similar condition, incidentally, is met with in erythema nodosum.

The usual sign of cardiac failure is of course breathlessness, but there are a few cases in which the earlier symptoms are purely gastric: those of a flatulent dyspepsia, fullness and slight distress after meals, and sometimes nausea, appearing gradually with no cardiac symptoms, no dyspnea, no palpitation, no heart consciousness. Nevertheless in these cases, soda, diet and carminatives are absolutely ineffective, while the symptoms clear up as if by magic with a few drops of tincture of digitalis three times a day. This therapy has in many cases to be carried on indefinitely to prevent a recurrence of the symptoms. The picture obviously is due to an early chronic passive congestion of the stomach and it was this group of cases that led my old chief, Dr. Osler, to say:

> "When an elderly patient consults you for dyspeptic symptoms, always think of them as being the first signs of heart trouble."

There are three other groups of digestive symptoms seen in cardiac disease, though met with much less frequently than the preceding group. First, those cases of angina pectoris with only upper abdominal symptoms, acute indigestion of the newspapers, where misinterpretation of the symptoms may lead to fatal results. Second, the picture may almost exactly duplicate gallstone colic and yet the disease involve the coronary artery. Incidentally the reverse of this picture, cholelithiasis with purely anginoid symptoms, is also met with in a very small group of cases. And third and last, severe pain may involve the upper right and left quadrants of the abdomen due to the sudden stretching of the capsules of liver and spleen by a rapidly developing passive congestion of cardiac origin.

These cardiac cases furnish us with the examples of all the causes of gastro-intestinal symptoms spoken of in the early part of this paper: those due to proximity, those due to circulatory disturbances, and those of reflex nervous origin.

In the genital apparatus, among the examples of referred symptoms are unrecognized and early pregnancy quite often treated as a gastric neurosis; and the severe gastric symptoms, usually anorexia or intractable vomiting due to a retroflexed uterus, especially in young neurotics. Of course we all know how frequently salpingitis, an ovarian cyst with twisted pedicle or a ruptured extra-uterine pregnancy is mistaken for acute appendicitis.

We have spoken of the reflex digestive symptoms in diseases of other organs: the heart, the

lungs, the endocrine system, the blood, the genito-urinary apparatus, and so on. Of no less interest are those cases in which the disease is gastro-intestinal with few or no local symptoms but only those manifested elsewhere in the digestive tract.

Unrecognized cholelithiasis or cholecystitis often gives the picture of an atonic dyspepsia, the flatulent nocturnal gastric indigestion of the fair, fat and forty. Gallbladder disease with symptoms exactly simulating duodenal ulcer, and the reverse, are not very uncommon. The gastrogenous diarrhea of the aged and the neurotic, where the cause is gastric achlorhydria, the symptoms intestinal hypermotility, should never be forgotten. With even greater frequency an unsuspected appendicitis may be regarded as peptic ulcer, colitis, proctitis with diarrhea, this last especially in children, or cases of persistent localized pain in the umbilical region. Chronic pancreatitis may exactly simulate carcinoma of the transverse colon. Dr. Halstead was one of the first to call attention to this; while carcinoma of the stomach may for a considerable period of time have only colonic symptoms, carcinoma of the colon only gastric symptoms. Cases of localized mucous colitis may have symptoms so suggestive of gallbladder disease or appendical attacks that surgery is sometimes employed, always with deplorable results.

It is this group of digestive diseases with referred symptoms within the abdominal cavity, adding to the difficulty of diagnosis by the ordinary means of examination and laboratory tests, that led Charles Mayo once to say that frequently in diagnosing abdominal conditions, experience many times before with the same group of symptoms, the same pain and the findings on those occasions when the abdomen was open, were more likely to give the right diagnosis than the most intensive clinical and laboratory studies.

I have tried to sketch, albeit in a very rapid and incomplete way, what to me have seemed to be some of the important examples of referred symptoms in digestive disease and the mimicry of digestive pathology by disease elsewhere. I have described briefly what seemed to be the anatomical or physiological explanation of many of these.

The clinical significance of these cases, the great necessity of recognizing referred symptoms in diagnosis, in prognosis and in therapy, are ample justification for this symposium. It is of even greater importance, however, because of the general lessons which may be drawn therefrom.

In the first place, it is a plea for a more thorough general study of every case presented to us, however local the disease may seem to be. It tells us that we must take better histories and interpret them better, that the physical examination must be complete, and that we must use the laboratory more intelligently, not utilizing every test blindly and indiscriminately, but selecting those likely to be of service. In other words, to get all the help we can from history, from physical examination and from laboratory findings, but never depend on one of these to the exclusion of the others.

Perhaps in this striving for the correct diagnosis, it is not out of place to mention the advice given by a very able clinician in this connection:

"Don't be too clever.

"Don't diagnose rarities.

"Don't be in a hurry.

"Don't be faddy.

"Don't mistake a label for a diagnosis.

"Don't be too cocksure and remember what Cromwell said to the Scotch bigots, 'Think it possible that you also may be mistaken.'

"Don't be biased and don't hesitate to revise your diagnosis from time to time in a chronic case."

In the second place, this symposium is an indictment of narrow specialization; it says in no uncertain words: man is an entity, not a summation of his organs and his systems, however carefully each of these be studied separately. Add together the findings of an eminent specialist in every field and you will not get the clinical picture of the case, for the organism is not the mere sum of its constituent parts. To be understood it must be studied, soma and psyche, as a whole, for no two men are alike morphologically, physiologically or psychologically.

And third and last, it is an unanswerable argument in favor of the return to a neo-Hippocratic method. We already see signs of this renaissance in the return of our faith in clinical methods, in the increasing interest of our young students in general medicine, in the rebirth of the idea that constitution, as well as a local pathological condition, plays a large part in disease, but now a constitution not of body form alone as of old, but of body form, of body function, of intellect and of emotion as well.

We see this in the increasing demand for a closer union between "those in the sickroom and those at the laboratory bench," and in the increasing recognition of medicine as a clinical science rather than a ruthless separation of clinician and research worker.

It is this sermon with its three texts that this symposium preaches, and this seems to me to transcend in importance anything else that may be derived from it.

ABDOMINAL SYMPTOMS OF CARDIOVASCULAR DISORDERS*

By JOHN T. KING, JR., M.D.
Baltimore, Maryland

After it was arranged to hold this conference on the interrelation of abdominal and thoracic diseases, the writer began to pay especial attention to the sub-diaphragmatic symptoms incident to the cardiac and vascular disorders that came under his care. Almost all the symptoms usually referable to the abdominal organs passed in review. Flatulence, abdominal pain, a sense of weight in the epigastrium, indefinable indigestion and dyspepsia, nausea and vomiting, anorexia and diarrhea were encountered incident to circulatory disorders. In some cases, in spite of careful interrogation, the digestive symptom or sign was the only one elicited, while the symptoms usually associated with the heart were lacking.

It goes without saying that constipation, hyper- and hypo-acidity and hemorrhoids were encountered frequently. It would, however, take a great many "control" groups to determine whether such symptoms were the result of heart disease in a significant number of cases. It is natural, however, that the traditional symptoms of cardiovascular disorders are present in a majority of such cases; hence, it is fair to assume that abdominal symptoms that concur in time with the usual cardiac symptoms and signs are probably associated with the cardiovascular disorder.

I have long recognized the fact that flatulence, or a sense of weight or oppression, sometimes described as a source of constriction in the epigastrium are common symptoms of hypertension and of cardiac disease, especially angina. The patient describes his attempt to eructate to relieve this symptom and is quite convinced that the final belching of gas relieves him. At the same time it is difficult to convince one's self that any substantial quantity of gas actually is raised. The description, well known to you all, is that gas "rises up and presses around the heart." In order to determine the incidence of this symptom I studied the records of 200 private office patients: these ambulant individuals were chosen in order to avoid the symptoms of gross heart failure. *Table 1* shows that this symptom occurred in 13 per cent of patients with hypertension (a systolic pressure of more than 140 being considered a hypertension). I was rather surprised to find the symptom even more common in a mixed group of patients with cardiac disease of various kinds. All patients with hypertension were excluded from this second group. The incidence of epigastric oppression or flatulence was 20 per cent.

Table 1
ABDOMINAL SYMPTOMS

	Pain and Tenderness	Flatulence	Indigestion, Dyspepsia	Nausea, Vomiting
Hypertension (100 cases)	9	13	13	8
Cardiac disease without hypertension (100 cases)	12	20	21	8

This sense of gas, oppression or constriction in the epigastrium may follow a meal or exertion. In an exaggerated form the condition becomes angina pectoris. In interpreting the symptom, we should bear in mind the proximity of the apex of the heart to the stomach. A sense of distress in the lower chest or epigastrium suggests to the patient that his stomach is at fault, as the symptom may be very similar to that of gastric or intestinal colic. I am inclined to the view that the distress in such cases is due to a slight tendency of the heart to dilate; I think the apparent relief from belching is purely coincidental and a misinterpretation of the symptom on the part of the patient. This symptom could hardly be due to passive congestion of the viscera, as cases of gross failure were excluded from the group and the symptom is a transient one.

In other cases this symptom or one similar to it may result from passive congestion of the viscera, in which case it may be of more persistent nature. A patient now under my care illustrates this point: she is an elderly white

*Read in Joint Session, Section on Medicine and Section on Gastroenterology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

woman who has never been ill; specifically she has never suffered from the more typical cardiac symptoms and had none when she consulted me. Her symptom consisted of a sense of "weight in the stomach," as if her food lay undigested for a long time. Examination showed a congenital cardiovascular disorder, with a patent ductus Botalli and a patent interventricular septum with a dilated heart and hypertension. Gastro-enterological studies were normal. On rest, massage and digitalis her symptoms disappeared.

Other individuals with cardiovascular disease complain of less definite indigestion or dyspepsia as a prominent symptom. This was found in 21 of 100 cardiac cases without hypertension and in 13 of 100 patients with hypertension. It seems reasonable to assume, in view of the rather persistent nature of dyspepsia of this sort, that it is due to a mild disturbance of the abdominal circulation; in other words, to a slight degree of passive congestion of the viscera.

The most clearly defined sign of circulatory difficulties below the diaphragm is engorgement of the liver. In order to determine the incidence of this sign I confined myself again to ambulant patients, seen at my office or in the Out-patient Department of the Johns Hopkins Hospital. I have attempted to exclude any case in which ptosis could be considered the reason of the liver's being felt or percussed below the costal margin. *Table 2* shows a synopsis of this

Table 2

RELATIVE INCIDENCE OF ENLARGED LIVER AMONG DIFFERENT GROUPS OF PATIENTS

	Per Cent Enlarged
Cardiac cases without hypertension (100 cases)	12
Hypertension cases (100 cases)	11
Aortic insufficiency (50 cases)	12
Mitral stenosis (50 cases)	42
Mitral stenosis and aortic insufficiency combined (28 cases)	25

study. The occurrence of this sign is rather uniform in three groups—that of the hypertensive patients, of mixed cardiac patients and of aortic insufficiency. In these cases the enlarged and usually tender liver represented an early stage of heart failure, though all these patients were ambulant. However, the incidence of hepatic engorgement in mitral stenosis is far larger than in the other groups, though evidence of gross failure was lacking. It is clear that some mechanism peculiar to obstruction at the mitral valve is responsible. Passive congestion it must be, but it is clear that the passive congestion spares the lungs to a large degree. Many of these patients have no symptoms or signs of significance referable to the lungs. It seems to me that we must look upon the liver in mitral stenosis as a reservoir that absorbs the back pressure of blood, that "takes up the slack." The congestion of the liver in these cases is often very specific, as no sign of congestion of the kidneys may be found and edema is strikingly absent. I cannot explain why the incidence of liver engorgement is less in the group with combined aortic insufficiency and mitral stenosis, but two considerations suggest themselves: first, the group is small and may not be representative; second, some cases included in this group may have had Flint murmurs incident to aortic insufficiency and not mitral stenosis at all.

I look upon liver engorgement in mitral stenosis as, in a sense, an adaptation. I have known ambulant patients with mitral stenosis to present enlarged livers for years, without other signs of circulatory failure. Respiratory symptoms are often notably absent. It has been my experience that these patients are little liable to attacks of pulmonary edema. This condition results from an inequality of function of the two sides of the heart: the left side fails, while the right, for the time being, maintains its vigorous expulsion of blood into the congested lungs. The result is the escape of fluid into the bronchi and great respiratory distress. On the other hand, the patient with mitral stenosis establishes a *modus vivendi:* the right heart gives way to a slight degree and the liver becomes engorged. Though this passive congestion represents in a sense a failure in compensation of the right heart, yet the majority of such patients are ambulant and more or less useful. The slight degree of right side failure affords, in all probability, an escape for the intra-pulmonary pressure and a safety-valve against pulmonary edema.

Nausea and vomiting may be a symptom of myocardial failure with congestion of the viscera. It is notoriously a symptom of bacterial endocarditis and may be very distressing. Moreover, it is commonly encountered in heart disease as a result of digitalis therapy. Occasionally a patient suffers nausea from 0.1 gm. of a powdered leaf of digitalis daily, without having had more even at the onset of treatment. This is uncommon, but individuals vary in their susceptibility to the effects of this drug. It seems to me the philosophy of despair for the physician to give digitalis until the patient is nauseated. With a little care, the point of satura-

tion may be determined before vomiting is produced: have the nurse note when the patient first has a revulsion to food and sends the tray away untouched. If the drug is reduced or withheld temporarily when this point is reached, one can spare the patient actual nausea and a very distressing experience. Occasionally, it may be impossible to determine whether nausea is due to digitalis or to passive congestion of the viscera. In a fibrillating heart a slow rate is usually an indication of digitalis effect, while in any circumstances the occurrence of frequent premature systoles, especially bigeminal rhythm, may result from the therapeutic dose of digitalis. If these signs fail, it may be impossible to say from bedside indications what is afoot. Two recent cases indicate a way out of this dilemma.

An elderly woman with hypertension and myocardial insufficiency had been treated with rest, massage and digitalis in the theoretically correct dosage. While on a dose of 0.1 gm. daily of powdered digitalis leaf by mouth, she suffered with an intermittent but annoying anorexia and nausea. There were no objective signs of digitalis effect. As it was considered quite important to know whether the drug should be continued or not an electrocardiogram was made. A typical digitalis effect upon the S-T segment of the tracing being observed, the drug was discontinued and the nausea disappeared. It may be argued that digitalis could have been discontinued as an experiment, without recourse to the graphic method; however, if we follow such a procedure routinely, a certain number of patients who are urgently in need of a protracted digitalis effect will be deprived of the best therapy.

A young woman with a typical rheumatic heart, mitral stenosis and auricular fibrillation was suffering from myocardial insufficiency, great respiratory distress and nausea and vomiting. She also had received the theoretically sufficient amount of digitalis by mouth and was being treated with a maintenance dose. She was in a serious condition and we did not wish to deprive her of digitalis unless it were proven that the nausea was of therapeutic origin. An electrocardiogram showed no digitalis effect; the dose of the drug was slightly augmented and the gastric disturbance subsided. The electrocardiogram is helpful in certain circumstances and the demonstration of the presence or absence of digitalis effect by this method may be of real importance.

Diarrhea may be an early symptom of heart failure. A patient with hypertension and occasional atypical angina developed a watery, somewhat frothy diarrhea. With no especial sense of indigestion she had several urgent, explosive liquid stools daily. No gastro-enterologic basis was found. Subsequently edema of the legs up to the knees appeared. Under rest in bed, with digitalis, all symptoms disappeared.

Anorexia may be a very serious complication of a circulatory disorder. In my experience, extreme anorexia is more characteristic of the graver types of cardiac involvement, particularly, perhaps, of those encountered in elderly patients. Two cases recently under my care illustrate this complication. An elderly professor suffered an attack of coronary occlusion, of which he presented a characteristic picture. Following the initial pain there remained a sense of fullness and distress in the epigastrium. While this was more or less constant, the patient believed it to be aggravated by the taking of food. Finally he complained that even water distressed him. Though he lived some ten days from the date of the occlusion, his nourishment by mouth was negligible. Most of what he attempted to take was regurgitated, and what he actually received was given by the parenteral route. Autopsy showed coronary occlusion with infarction of a large part of the left ventricle, including the apex. In this case, circulatory failure with passive congestion did not appear until shortly before death. I am inclined to attribute the gastric symptoms in such a case to a reference of symptoms. When one considers the anatomical proximity of stomach and apex of the left ventricle it is not surprising that distress in one of these organs is referred by the patient to the other and *vice versa*. Another elderly patient, following an attack of pulmonary edema, complained more of gastric disturbance and of anorexia than of any other symptom. In this case, the evidence of passive congestion was slight. The patient improved after weeks of rest. Though a physician himself, he felt so sure he had a digestive disorder that his first expedition on getting out of bed was to a roentgenologist. The stomach was found normal. As the condition of this patient's heart improved the anorexia became somewhat less disturbing. In this case, it seems to me, there are two factors behind the anorexia, referred cardiac distress and a mild passive congestion of the viscera.

As my primary purpose today is to present to you my own clinical material and working hy-

potheses, such as they are, intensive search of the literature is not necessary. However, let me outline briefly some of the existing views. There is considerable divergence of opinion with regard to the relation of gallbladder and heart disorders. Brown[1] has reported cases suggesting the two conditions may be confused and that they may co-exist. Horine and Weiss[6] combat vigorously the concept that heart disease, excepting functional disorders, is the result of biliary tract disease, or that the two conditions are related except in an accidental manner. Perhaps the most impressive statement of the case is that of Tennant and Zimmerman,[14] based on 1,600 autopsies. These observers found a significant association between the occurrence of heart disease in general and gallbladder disease, though specific relation between endo- and myocarditis and gallbladder disease was not clear. I must say that I have not been impressed by there being any clinical importance in this alleged relationship. Particularly, I do not think we need be concerned seriously about the effect of heart upon gallbladder. It should be noted, however, that Chiray and Amy[3] think that transduodenal biliary drainage may cause marked relief of digestive symptoms in the hepatic congestion of heart failure.

On the other hand, hepatic congestion is a striking feature of many cardiac patients, as has been pointed out. A subicteric tint to the skin is not very uncommon in mitral disease, even when compensation is fairly well maintained. Among the 100 ambulant patients with hypertension of which I have spoken, jaundice did not occur. In the mixed group of 100 cardiac patients it was noted twice. The hypothesis of Rich[9] on this type of jaundice appeals to me. He thinks the degeneration of the centers of the liver lobules from congestion and anoxemia causes a diminished excretory power of the liver with "retention" jaundice while actual necrosis leads to the "regurgitation" of bile and its adoption by the vascular system. Osler and Gibson[7] have stressed the frequency of enlargement of the liver in mitral insufficiency and remind us that ascites may be the only form of dropsy present. This picture is the one which I have most frequently seen in mitral stenosis, many cases of which of course have an associated insufficiency.

Robinson[10] says that a larger number of patients suffering from mitral stenosis apply for treatment on account of gastro-intestinal symptoms than from any other cardiac disease. This is quite in accord with our observations. Not only is the liver congested, but Rahier[8] has pointed out a very interesting occurrence of decrease in volume of gastric juice, atony, and suppression of acid during heart failure: clearing up of the circulatory failure leads, he says, to a restoration of gastric function.

Finally, so much has been written concerning the abdominal pain occurring at times in angina and in coronary occlusion, that I shall not enter this field. These conditions can usually be differentiated properly from acute abdominal disorders by a careful consideration of the associated symptoms, and a cardiovascular examination including, if possible, an electrocardiogram.

A thoroughgoing analysis of abdominal symptoms of cardiac disease would include almost every variety. In patients with cardiac disorders which make them liable to left heart thrombi and subsequent discharge of emboli, it is conceivable that almost any variety of abdominal pain may be simulated, as infarction of any structure is possible. In gross heart failure with passive congestion, the abdominal organs and functions are disturbed regularly in various ways. I have tried to sketch briefly what in my experience are the commoner evidences of circulatory disorder as it is reflected below the diaphragm, with my working hypotheses with regard to them. The explanations I have offered are not based upon scientific data, but simply reflect my thoughts. The clinical material was mostly obtained at first hand and I shall leave you to your own conclusions of the underlying theory.

CONCLUSIONS

(1) The common abdominal symptoms in both hypertension and cardiac disease are flatulence, upper abdominal pain and tenderness and ill defined dyspepsia.

(2) Enlargement and tenderness of the liver are much more frequently encountered in cases of mitral stenosis than in other forms of heart disease or in hypertension.

(3) It is thought that such hepatic engorgement represents a slight failure of the right heart and that the result is a partial protection of the subject from pulmonary edema.

REFERENCES

1. Brown, T. R.: Cardiac Symptoms in Unsuspected Gallbladder Disease. Libman Anniversary Volumes, **1**:265, 1932.
2. Burns, G. R.: Heart Conditions Simulating Acute Abdominal Symptoms. Canad. Med. Assn. Jour., **25**:424, Oct., 1931.
3. Chiray, M.; and Amy, P.: Valeur therapeutique du drainage medical biliare dans la congestion passive du foie (foie cardiaque). Paris Med., **79**:463, May 16, 1931.

4. Friedenwald, Julius: The Functions of the Stomach as Influenced by Diseases of Other Organs and Their Interrelationship. Med. Clin. N. Amer., **16**:1043, March, 1933.
5. Gibson, A. G.: Osler and McCrae's Modern Medicine, **4**: 521. Philadelphia: Lea & Febiger, 1927.
6. Horine, E. F.; and Weiss, M. M.: Abdominal Symptoms in Manifest Heart Disease. Sou. Med. Jour., **25**:692, July, 1932.
7. Osler, W.; and Gibson, A. G.: Osler and McCrae's Modern Medicine, **4**:552. Philadelphia: Lea & Febiger, 1927.
8. Rahier, C.: Le chimisme gastrique dans l'insuffisance cardiaque. Presse Med., **39**:855, June 10, 1931.
9. Rich, A. R.: The Pathogenesis of the Forms of Jaundice. Johns Hopkins Hospital Bull., **47**:338, 1930.
10. Robinson, G. C.: Nelson Medicine, **4**:509, 1923.
11. Salzmann, H. A.: Bauchschmerzen bei Kreislauferkrankungen. Mitt. a. d. Grenzgeb. d. Med. u. Chir., **42**:530, 1931.
12. Schwarz, H.; and Dibold, H.: Leber Funktionsstorung bei Herzkranken. Klin. Wchnschr., **10**:1492, Aug. 8, 1931.
13. Skinner, A. H.; and Gillison, K.: Acute Pericardial Effusion Simulating Hepatic Abscess. Chinese Med. Jour., **46**:465, May, 1932.
14. Tennant, R., Jr.; and Zimmerman, H. M.: Association Between Disease in the Gallbladder and in the Heart as Evidenced at Autopsy. Yale Jour. Biol. & Med., **3**:495, July, 1931.
15. Thomason, T. H.: Referred Abdominal Pain. Texas State Jour. Med., **28**:519, Dec., 1932.

EMOTIONAL AND NERVOUS FACTORS IN SYMPTOMS OF ABDOMINAL DISEASE*

By W. W. Young, M.D.,†
Atlanta, Georgia

A sage once remarked that there is nothing new under the sun. A review of the empirical observations of the past leads one to feel that the further research progresses, the more one must become archeologically minded. Much of our boasted progress consists in proving our forebears right when, because of their position in antiquity, we feel they must have been wrong. From the earliest recorded observations it may be gathered that man soon concluded that there exists an intimate relationship between situation and feeling and, in turn, that feeling is largely somatic in quality and bulks large in gastro-intestinal symptoms. Thus much has been written concerning the relationship between emotional states and abdominal symptomatology. So archaic is this concept that the maternal warning that if one quarrels at the table indigestion will ensue is a tradition. It is to be feared, however, that stress on isolated facts has more recently tended to lead us to a neglect of the more important interrelationships. Consequently, the mere fact that the somatic accompaniments of feelings are known does not mean that our viewpoint is less narrowed. Nor does the fact that the consequent physiology of the gastro-intestinal system with its complex components in glandular response becomes more and more a commonplace with isolated research endeavors, make us less myopic in our vision.

Many actual physiologic components of emotional reaction were observed objectively as early as the beginning of the Nineteenth Century. This work has grown until today the volume of findings is well-nigh monumental. Every day more evidence accumulates. The current magazines on nervous and mental disease are filled with reports on research in metabolic findings in cases of emotional maladjustment. It is doubtful, however, that we have yet plumbed the depths of metabolic, glandular and motor experiences which are dominated affective. The more overt accompaniments are so well known as well-nigh to constitute bywords. Every day experience demonstrates the association. Every one is familiar with the water pitcher placed on the table of the speaker of the evening. The anxiety produced by the responsibility he assumes results in the suppression of salivary secretion. The fact that this same speaker after a preliminary period of urinary suppression finds it necessary to relieve his distended bladder of large quantities of urine of low specific gravity is a commonplace. The approach to an insurance examination whose outcome is dubious may render the traditional specimen of such low specific gravity as to throw the client out of the running.

It is a biologic axiom that there must exist an antagonism between the motor defensive responses and those which have to do with assimilation. Katabolism and anabolism are mutually exclusive. Fear and anger must mobilize all possible energy for motor activity. Thus it is necessary to inhibit every energy-consuming activity not immediately essential to flight or fight. Digestion and assimilation are then put in temporary abeyance. Katabolism is dominant and anabolism subservient. The ruminant exemplifies this beautifully. Since he has a poor defensive organization the food, quickly eaten, is stored in a reserve space until the probability of situations tending to precipitate fear is excluded. Then the process of mastication and subsequent digestion proceeds. It seems quite evident that the affective states are phylogenetically and fundamentally defensive.

Much has been done to give information concerning the glandular responses in affective states. For instance, it has been shown objec-

*Read in Joint Session, Section on Medicine and Section on Gastroenterology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†Associate Professor Psychiatry, Emory University.

tively that the gastric secretions are lessened or suppressed in states of anxiety or anger. Cannon has demonstrated that it is possible for an isolated gastric analysis to show evidence of absence of active secretion in states of great emotional stress. Subsequent analysis in the same individual may be perfectly normal. Perversion of the external secretions of the pancreas in emotional states has been proven. Similarly the flow of bile may be influenced to a marked degree. Thus the effects of affective states on somatic glandular activity is far-reaching. What a panorama of digestive symptoms opens up! The perverted salivary secretion, pepsin, hydrochloric acid and pancreatic secretions with the digestive sequelae, and the abnormal biliary output with incompetent fat metabolism promise unending vistas of abdominal symptoms. So multiform are the subjective complaints and objective manifestations that Alvarez has been able to write a monograph of two hundred and eighty-four pages on "Nervous Indigestion."

The visceromotor components of emotional states are even better known. Radiographic studies have demonstrated the various distortions in motor activity. The cardiospasms, pylorospasms, and "spastic colitis" are well-known manifestations in "tense," "anxious" types. Distortions in the conformation of the stomach, the so-called "hour-glass" contraction, for instance, may be found at one examination and may have disappeared at the next. The tight anal sphincter with consequent structural changes, setting up a vicious circle, is another familiar object. Cushing, in his more recent productions based upon profound thought and a wealth of experience, has shown the probability of structural change resulting from visceromotor imbalance. The probability of a central vegetative coordinator grows with increasing evidence. Cushing seems to have shown conclusively that traumatic impacts on this center may result in ultimate structural visceral change. It seems quite probable that functional buffets in turn produced by affective states may give similar results. Gastric and duodenal ulceration is not far removed from domestic, social and economic insecurity.

The physician, however, is apt to have his attention so riveted upon the presenting somatic complaints and the subsequent confirmatory objective findings that he loses sight of larger issues. It is often forgotten that one is dealing with a person and a person, at that, who only incidentally has organs with perverted function or structure. Consequently, a consideration of the situation within the individual too often narrows to somatic conduct forgetful of a long train of habit formations, resulting from experience superimposed on structural constitution eventuating in personality. Wherever the presenting complaints are somatic and lack the possible emergency elements of fever and leucocytosis, the failure to make a study of the personality lays the individual physician liable to gross error. Too many stomachs have been subjected to needless operation on the basis of radiographic distortion. Too many organs have been attacked surgically or with drug therapy, placebo and specific, because of isolated evidence of functional or structural change. Sir Thomas Horder, among his rather remarkable aphorisms, has said: "The patient who begins a lengthy account of his symptoms by a detailed description of his stools is probably suffering from hypochondriasis." There is the disease of the organ and there is the disease of the person and one cannot be too much concerned with the one to the neglect of the other.

Not only must study be directed to the structural and physiologic changes in the organ and the weak spots in the personality shown in habit formation which renders adjustment difficult, but also to a consideration of the situation. This means a study of the sociologic, economic and domestic aspects involved. Too often the patient is not relieved because of a neglect of these considerations. Thought must be given to the type of social strivings and the results obtained; to the amount of satisfaction in or maladjustment to the daily routine of gainful employ; and finally, to that most intricate of all life's adjustments, the family situation. A recent case of pellagra might have gone unrelieved had it not been considered important that the pellagra was associated with dipsomania; the dipsomania in turn consequent upon a domestic situation; and this latter maladjustment intimately concerned with personality defects resulting from habit formations in childhood. A patient with convulsive seizures following evenings of frequent cocktails came to our attention. Neurologic examinations being non-productive, metabolic disturbances were considered. The blood sugar was persistently low. After a good stiff drink the blood sugar level was increased. Thus the liquor was not a direct cause. The history showed that after an evening of many cocktails the taking of food the next day became impossible. There was a consequent day of starvation, resulting in a con-

vulsion in the late afternoon. Fasting under ordinary laboratory conditions brought the blood sugar to 54 mg. per 100 c. c. by 4:30 p. m. The patient became increasingly more drowsy, so that it was difficult for her to control the impulse to sleep. No explanation for the habitual low blood sugar has been found. Abstinence from liquor, however, has solved the immediate problem. The situation in both instances is an important factor.

The situation is not always so evident. One is apt to be lost in a maze of somatic complaints and thus lose sight of the fact that a person has consulted the physician. The ordinary complaint as taken, with its stress on various pains and discomforts, in its very overtness, frequently masks the facts. Dr. George S. Stevenson has emphasized the necessity for getting back of this to the motive which brings the patient to the physician. The motive is frequently not that recorded in complaint, but something deeper which will become evident only on study of personality and situation. The impact of personality on situation may result in anxiety. Anxiety in turn is accompanied by the well-known somatic equivalents; rapid or irregular heart beat; decrease or cessation of gastro-intestinal peristalsis and secretion; increased muscle tone with consequent tremors; dilatation of the pupils, and so on. What a splendidly facile excuse these feelings offer for evasion of difficult realities! What a ready defense organic disease may give! If the individual can only be convinced and in turn convince others of the tangible reality and organic facsimile of his disability, what a panorama of possible evasions opens to the psychic view! Such an individual shops from physician to physician, determined to prove his point, until some unwary member of this honorable profession confirms his hopes and fixes him in a chronic invalidism.

Physicians must be concerned with a broader vision. There is the disease of organ; the disease of person, and the disease of situation. The concern should be with all aspects. A wary student cannot afford to neglect a consideration of any one component. A study must be made of organic structure and physiologic response; of the structure and behavior of the personality; and of the situation in which this aggregate finds itself. Having made such a study, a somewhat philosophic formulation must result. Out of this in turn with the help of chemotherapy, physiotherapy, social agencies and sound re-education in habit formation and shifts in attitude, there may be made a readjustment of a complete or partial liability into a true asset. A consideration of the person as a whole cannot come from a narrowed physiologic, structural or behavioristic attitude, but by taking the broader, more philosophic one which more or less characterized the family physician of several decades ago. In this a liaison is needed between the various so-called specialties until individual interests are lost in a consideration of the problem as a whole.

REFERENCES

1. Cushing, Harvey: Balfour Lecture, Toronto, April 8, 1931. Chas. C. Thomas, 1932.
2. Alvarez, W. C.: Nervous Indigestion. Paul B. Hoeber, 1931.
3. Molcen, Geo. A.: Influence of Emotional Shock on the Gastro-Intestinal Tract in the Psychoneuroses. J.A.M.A., **95**:910-912, 1930.
4. Stevenson, Geo. S: Why Patients Consult the Gastro-Enterologist. J.A.M.A., **94**:333-337, 1930.
5. Alvarez, W. C.: Ways in Which Emotion Can Affect Digestive Tract. J.A.M.A., **82**:1232, 1924.
6. Cannon, W. B.: Body Changes in Pain, Hunger, Fear and Rage. D. Appleton & Co., 1915.

ULCERATIVE COLITIS: I. THE RELATIONSHIP BETWEEN BACILLARY DYSENTERY AND ULCERATIVE COLITIS*

By THOMAS T. MACKIE, M.D.,†
With the Assistance of
MARY S. B. GAILLARD, A.B.,
New York, New York

Throughout the history of ulcerative colitis there is recognition of many points of similarity to bacillary dysentery despite different theories of etiology and conflicting bacteriologic studies. This finds expression in the words of Sir Samuel Wilks,[1] who first described the disease:

"There is * * * difficulty in distinguishing dysentery from simple colitis by anatomical characters. Dysentery, in fact, produces a variety of colitis distinguished from others by a special course, and by clinical phenomena; though when the dysenteric fever has passed off, the state of the colon which is left is much the same as that of simple ulceration."

---

*Read in Joint Session, Section on Medicine and Section on Gastroenterology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933, this paper being a contribution from the American Society of Tropical Medicine to this Joint Session.

*From the Department of Public Health and Preventive Medicine, Cornell University Medical College, and the Department of Medicine, The Fifth Avenue Hospital, New York City.

†Research Associate, Department of Public Health and Preventive Medicine, Cornell Medical College; Associate Physician, The Fifth Avenue Hospital.

And conversely Gemmel[2], reporting an outbreak, remarked:

"* * * this colitis as it appears in asylums is not, as is often stated, a simple colitis, but is nothing more nor less than dysentery."

Martin[3] described it as a disease which is listed under a different heading, but which has, nevertheless, the morbid anatomy, the symptoms, and the treatment of dysentery. Saundby[4] and Hawkins[5] held the two to be identical, and more recently Hurst[6] has revived this concept. The growth of this idea has been supported by the occasional recovery of the dysentery bacilli, by the response to therapy, and by the morbid anatomy.

Published descriptions of the pathology emphasize the similarity of the anatomic changes in the two diseases seen through the sigmoidoscope. The primary lesion of bacillary dysentery is essentially in the mucosa of the colon. Inflammation, edema, granular degeneration, and thickening due to fibrinous exudate are present. Superficial ulcers with red, slightly depressed bases result from separation of the epithelium. The whole length of the colon may or may not be involved. In the chronic stage it is extensively affected, presenting irregular depressed ulcers with little or no healthy mucosa intervening. The primary lesion of ulcerative colitis, likewise, is found in the mucous membrane of the colon. Congestion, inflammation, and patches of localized necrosis occur. Gradual separation of the necrotic tissue leads to the formation of superficial ulcers. Their edges are not undermined and the floor is usually formed by the submucosa or the muscularis. In severe cases deeper ulceration may occur. The submucosa and muscularis are infiltrated with small round cells. Extreme thickening and contraction of the wall of the colon irons out the mucosal folds, producing a smoothed surface.

Changes have been noted in the small intestine in the two diseases. Bacillary dysentery may affect the terminal portion of the ileum by a process similar to but of less severity than that encountered in the large intestine. In ulcerative colitis, also, inflammation and ulceration of the ileum have been reported by White,[8] Gemmel,[2] Hunt,[6] Sopre,[9] Brown and Paulson,[10] and Hern.[11] In this disease, however, Thorlakson[12] considers it extremely rare to find lesions extending above the cecum.

This striking anatomic resemblance led Hurst to test the therapeutic value of polyvalent antidysentery serum in ulcerative colitis. He reported excellent results in early cases. In the chronic stage of the disease serum produced less marked immediate improvement, but appeared to accelerate recovery.[6 13 14 15] The beneficial effect he considered specific and not due solely to the action of foreign protein. The favorable response to serum therapy led him to the conclusion that *B. dysenteriae*, or closely related organisms, must be held accountable for the disease in spite of the fact that attempts to isolate the bacilli were unsuccessful, and the patient's serum failed to agglutinate stock strains of dysentery bacilli.

More definite evidence of a relationship between the two diseases has been slow to accumulate. In recent years, however, positive cultures have been obtained from scattered cases. Nabarro[16] isolated *B. dysenteriae* from a case of ulcerative colitis in 1912. Young[17] recovered Flexner bacilli from one case, and Dudgeon[18] from two cases. Thorlakson[12] reports that Cadham has isolated the dysentery bacilli from six cases. Winkelstein[19] obtained members of the Flexner or Shiga groups from four cases, and Mackie[20] Flexner bacilli from one. Recently Hurst[21] has found Flexner bacilli in one case and Strong bacilli in another.

On the other hand, cultural attempts and agglutination reactions using the patients' serum against stock strains of *B. dysenteriae* have been unsuccessful in most instances. Logan[22] did not attempt to isolate dysentery bacilli from his cases. In six, when the complement fixation reaction was used, he obtained "practically negative results." Yeomans[23] made stool cultures without success. Until recently Hurst was unable to obtain cultural or serologic evidence to support his belief. Torrey[24] failed to find a representative of the dysentery group, and Bargen[25] has not encountered them.

These failures have led most commentators to the conviction that the two diseases are in fact separate and distinct entities. A variety of objections to the concept of a significant relationship between the two have been raised: the dysentery bacilli have rarely been recovered from cases of ulcerative colitis; the patient's serum has seldom been found to possess specific agglutinins in significant titre. On epidemiologic grounds, also, a relationship is held improbable: bacillary dysentery is considered contagious and easily transmissible; while two cases of ulcerative colitis are rarely encountered within the same family or in the same neighborhood. The increased incidence of this disease, and the apparent rarity of bacillary dysentery in adults, are considered significant. The age incidence of the two diseases are held to be dissimilar. The clinical pictures are said to differ in that ulcerative colitis seldom commences as the characteristic short and sharp attack typical of dysentery. Hern[11] is unwilling to accept the apparently favorable effect of antidysentery serum upon certain cases of colitis as valid evidence. He contends that, if its therapeutic action were specific, it would constitute a solitary exception

to the rule that specific passive immunization is of no value in chronic infection. Furthermore, both Hern and Paulson[26] question the etiologic relationship of *B. dysenteriae* to the lesions of chronic or recurring bacillary dysentery, the former saying:

"While it is clear that *B. dysenteriae* may be recovered in the stage of chronic dysentery and that it is embedded in the tissues rather than free within the lumen, its causal re'ationship to the lesions of chronic dysentery is a little incredible, especially in view of the severity of the disease and the paucity of the organisms. One cannot lightly discard the alternative hypothesis that recurrent dysentery is really ulcerative colitis to which acute dysentery has predisposed the patient."

These arguments merit discussion.

Zinsser[27] has called attention to the fallacy of considering bacillary dysentery a disease which occurs only under epidemic conditions. The rarity of mass outbreaks does not preclude its endemic occurrence. Vedder and Duval[28] found sporadic cases which did not become centers of dissemination. Flexner and his associates[29] isolated *B. dysenteriae* from 63.2 per cent of 412 unselected cases of summer diarrhea of children in New York City under conditions which did not present the features of a spreading epidemic. Evidence collected during the War years indicates that the Flexner group is universally distributed, while the Shiga strains are more commonly encountered in tropical and subtropical regions. The Sonne bacilli, or late lactose fermenters, have been found in this country associated with severe and mild cases of dysentery.[30] Silverman and Harris[31] consider the disease endemic and on the increase in the southern United States. Soule and Heyman[32] have encountered sporadic cases as well as epidemic outbreaks in Michigan, and the writer has seen scattered cases in New York City without apparent infection of contacts. One is led to believe, therefore, that in the absence of specially favorable conditions, the notorious lack of viability of the dysentery bacilli in the stoo'ls, and their transitory appearance, render them less easily transmissible than is commonly believed.

Eyre[33] pointed out in 1904 that stools and postmortem material must be examined fresh, for he found that "in cases of chronic asylum dysentery, *B. dysenteriae*, if present, is so outnumbered by *B. coli* and other intestinal saprophytes as to make its isolation a matter of extreme difficulty." This seems to depend in part upon the time interval between evacuation and culture, the character of the stool and the selection of material from it, the media chosen for primary isolation, and in part upon a factor which appears to be characteristic of dysentery infections in general. In the acute disease stool cultures are frequently negative unless made early.[34] In the chronic stage they are almost invariably so. Not uncommonly in these cases the excretion of bacilli is intermittent and long periods may pass during which none of the organisms can be recovered.[35] Flexner bacilli have been found to be almost twice as difficult as Shiga to isolate, and in most instances they can be demonstrated only at rare intervals.[36] This intermittence Fletcher and Mackinnon[37] consider to be a characteristic of chronic bacillary dysentery.

The agglutination reaction similarly is not dependable as a means of diagnosis, nor as an accurate method of eliminating the possibility of infection. According to Fildes,[38] 40 per cent of patients excreting Shiga bacilli did not possess agglutinins for this organism in significant titre. In Flexner infections approximately 80 per cent failed to react positively with members of this group. The patient's serum when positive is usually of low titre, seldom active in dilutions above 1/500, and frequently only in lower dilutions. Furthermore, the activity of the serum diminishes rapidly after reaching its peak in the early stages of the disease. Serologic diagnosis of Shiga infections is more dependable.[39] These difficulties probably result from antigenic variations of different strains. While the Shiga baci'li seem to be uniform in this respect, Murray[40] showed that the so-called Flexner group comprises a large number of related organisms with varying antigenic spectra.

The discrepancies between the clinical pictures of the two diseases are to a large extent based upon the classic febrile illness long associated with bacillary dysentery. The onset of ulcerative colitis, however, though usually gradual, is sometimes acute with severe diarrhea and fever. Conversely, the dysentery bacilli may cause only mild intestinal inflammation and even simple diarrheas. It is probable that they are factors in many sporadic cases and small group attacks of diarrheal diseases which in their clinical phenomena cannot strictly be classified as dysentery. The symptoms produced by members of the Flexner group are usually mild even during the acute stage. During the war many of the mild cases subsequently proven to be bacillary dysentery were so transient and slight that the individual rarely reported himself to be sick during the initial attack.[41]

Transitory intestinal symptoms in adults are seldom made the object of bacteriologic investigation, while the importance of dysentery bacilli in infantile diarrhea is well recognized and the search for them usual. It seems not improbable, therefore, that the apparent difference in the age incidence of reported dysentery and of ulcerative colitis may depend upon failure to recognize mild bacillary infections.

There remains the doubtful role of these organisms in the pathology of chronic bacillary dysentery. This cannot be determined at present.

The controversy concerning a fundamental relationship between the two diseases remains unsettled, and the present study was undertaken to obtain additional evidence. In conjunction with the bacteriologic investigation which forms the basis of this report a comprehensive clinical study, and in many cases a detailed radiographic

examination of the whole gastro-intestinal tract, has been made. While these will be reported separately, the findings on x-ray are relevant to the present discussion.

Reference has been made to the not infrequent involvement of the small intestine in acute bacillary dysentery. Rogers,[42] however, does not refer to this in association with the chronic disease, and while lesions in the small intestine have been reported in ulcerative colitis, they are considered to be extremely rare.[12] Using a standardized x-ray technic, Dr. Robert E. Pound, of the Fifth Avenue Hospital, has shown that distinctive and uniform changes are demonstrable in a large proportion of the cases so far examined. These may be summarized briefly. There is commonly a delay in the passage of the barium from stomach to cecum often associated with undue gastric retention, accompanied by rapid passage through certain of the groups of coils of the small intestine, and stasis in certain others which appear definitely dilated. Evidence of structural change in the walls is frequently demonstrable, most commonly in the duodenum and terminal ileum, but also in the jejunum and lower segments. This appears on the film as a definite alteration of the normal mucosal pattern with a widening and thickening of the individual valvulae conniventes. These findings have been partially confirmed at operation in certain cases. While the observations are insufficient in number as yet to correlate the x-ray changes with the detailed pathology, it is significant that in a recent case with obvious deviations from normal on the film, exploration revealed a thickened, edematous, and congested segment of terminal ileum from which a typical mannite fermenting dysentery bacillus was isolated.

The radiographic evidence of small intestinal disease does not parallel the extent of the involvement of the colon. In the case just referred to, x-ray showed a definitely abnormal terminal ileum, a normal cecum and ascending colon, and an extensive involvement of the distal colon. This was confirmed at the operating table. It is evident, therefore, that the changes proximal to the ileocecal valve depend upon some factor other than direct extension.

The scope of the bacteriologic studies has been limited to the search for evidence of infection by *B. dysenteriae* as shown by culture, the agglutination reaction, and the presence or absence of specific bacteriophage in the patient's stool. Observations have been made upon eighty-three consecutive cases of ulcerative colitis seen in hospital, dispensary, and private practice in New York City during the last two years. A control group of one hundred and three individuals obtained from the same sources and suffering from a wide variety of conditions, has been examined by the same methods. In certain instances, unfortunately, in each series it has been impossible to make complete studies, and while all cultures from cases of ulcerative colitis were made direct from swabbings of the diseased mucosa taken through the sigmoidoscope, this procedure was carried out in only fifty-four of the controls.

METHODS

Plates of MacConkey's medium and tubes of plain broth, pH 7.4 to 7.6, were inoculated direct from the mucous membrane or from the stool. After two hours' incubation the broth cultures were streaked on MacConkey plates. Suspicious colonies from this medium were examined by gram stain; tested for motility by the hanging drop method, using a four to six hour growth in broth, and by stab culture in 0.5 per cent hormone agar; and sown into the semi-solid sugar media, peptone broth, and litmus milk. Readings of the sugar fermentations were taken through five to seven days' incubation, and of the litmus milk cultures over a twenty-one day period. In most instances the fermentation reactions were confirmed by Dunham tube cultures. Organisms which conformed to the cultural requirements were tested against the serum of rabbits immunized against stock strains of Shiga, Flexner and Sonne dysentery bacilli obtained from Professor E. G. D. Murray, of McGill University, and from the American Type Culture Collection.

Standardized antigens were prepared from the stock strains[30] for use in agglutination tests with the patient's serum. Agar cultures were transplanted twice daily for ten sub-cultures and the growth then washed off with normal saline containing 0.1 per cent formalin. After filtration through sterile linen and standardization to five hundred million organisms per c. c., the agglutinability of the antigen was measured in homologous immune serum. In performing the Widal test the tubes were kept in the water bath at 55° C. for four hours and then at room temperature for fifteen minutes. Readings were made with a hand lens against a dark background.

Specimens of stool or of the intestinal discharges to be tested for bacteriophage were emulsified in broth and incubated overnight. After centrifuging, the supernatant liquid was filtered through a Berkefeld candle. One-half c. c. of the filtrate was added to 3 c. c. of three-hour broth cultures of the stock strains of dysentery bacilli, incubated, and observed from time to time for clearing of the turbidity.

The difficulty in the interpretation of the Widal reaction in bacillary dysentery which others have emphasized, necessitated the designation of an arbitrary standard for diagnosis. Winne[43] considered definite agglutination at a dilution of 1/100 significant. Ritchie[44] studied

seven hundred and ninety-two normal individuals, none of whom were known to have been exposed to infection, using living twenty-four hour agar cultures as antigen. He concluded that a positive reaction in a dilution of 1/64 with the Shiga bacilli and of 1/125 with the Flexner races could safely be considered diagnostic. Gardner,[45] however, states that normal individuals may agglutinate Flexner bacilli up to 1/150. Recently the use of formolized antigens has been found to reduce non-specific agglutination, and with them Dudgeon[39] regards a positive reaction with Shiga bacilli at a dilution of 1/40 as diagnostic. In infections with the Sonne group 75 per cent of patients are said to react positively at 1/25, while 99 per cent of normal individuals give negative agglutination reactions at this dilution. With the Flexner bacilli, on the other hand, it is impossible to set a precise dividing line which will be free from criticism. In view of the investigations quoted, for the purposes of this report, definite agglutination of the Shiga bacilli in a serum dilution of 1/80, and of the Flexner and other races in a dilution of 1/160, have been adopted as indicative of infection.

The findings in the control group indicate that bacillary dysentery occurs endemically (*Table 1*). Mannite fermenting dysentery bacilli were recovered from two of one hundred and two cases cultured, in one instance from the stool and in the other from swabbings of the mucosa of the rectum. Both of these patients were suffering from acute diarrhea, and both failed to agglutinate the stock antigens.

Six individuals, of one hundred and three tested, agglutinated some strain of *B. dysenteriae* in a dilution of 1/160, and in an additional case a positive reaction was obtained at 1/320. Two of these controls gave histories which afforded no suggestion of infection, one a technician in the bacteriology laboratory and the other a patient with a *Streptococcus viridans* endocarditis. A third was a young man with an active amebic diarrhea acquired in the Congo, where he had had a severe dysentery a year previously, in which bacillary infection may have played a part. This is listed as a questionable history. The anamneses of the four remaining individuals are suggestive of infection by *B. dysenteriae*.

Case 70.—A student nurse had an acute diarrhea with fever and blood in the stools eight years ago, followed by "colitis" for two years. The diarrhea has returned periodically since. She was examined during an afebrile recurrence. Sigmoidoscopy was negative.

Case 85.—An adult white woman for several years had suffered from recurrent attacks of diarrhea with mucus, but no blood. Sigmoidoscopic examination was negative.

Case 5.—A middle-aged white woman had attacks of chronic diarrhea for six years past, with as many as fifteen to twenty stools a day containing mucus, but no blood. Sigmoidoscopy revealed only slight hyperemia of the rectum.

Case 79.—A middle-aged white woman had an attack of watery diarrhea without blood, mucus or fever two years previously. Two months before examination she had a similar attack with mucus in the stools, but no gross blood, moderate distention, and tenderness in the left lower quadrant. Sigmoidoscopy was not performed.

The ulcerative colitis group, however, present a very different picture. In thirty-five, or 42 per cent, of the eighty-three cases there is evidence of infection by the dysentery bacilli on culture or by agglutination against stock strains. Typical organisms were obtained from seventeen cases, or 20.4 per cent. These are principally of the Flexner type, less commonly the Sonne. In two instances inagglutinable organisms were recovered conforming in other respects to the Shiga bacilli (*Table 2*). Ten of the patients from whom positive cultures were obtained failed to agglutinate stock strains of dysentery bacilli to a dilution of 1/160. Similarly, nine failed to agglutinate their own organisms to significant titre and six possessed no demonstrable agglutinins for their own bacilli. Three of the nine strains which did not agglutinate satisfactorily in the host's serum were also inagglutinable in immune sera, but when sub-

Table 1

POSITIVE FINDINGS, CONTROL CASES

Case No.	Culture 102 Cases	Agglutination 103 Cases	History	Clinical Diagnosis
34	0	1/160	Negative	Subacute bacterial endocarditis
61	0	1/160	Negative, lab. technician	None
70	0	1/160	Suggestive of dysentery	Chronic diarrhea
85	0	1/160	Suggestive of dysentery	Chronic diarrhea
96	0	1/160	Questionable	Amebic diarrhea
5	0	1/160	Suggestive of dysentery	Recurrent diarrhea
79	0	1/320	Suggestive of dysentery	Recurrent diarrhea
48	+	0	Suggestive of dysentery	Acute diarrhea
109	+	0	Suggestive of dysentery	Acute diarrhea
Tot. 9	2	7	Suggestive history 7	

mitted to the laboratories of the New York City Board of Health for confirmation were reported culturally members of the dysentery group. *Cases 11* and *12* could not be completely studied, but dysentery bacilli of the Flexner type were obtained from each by the New York City Board of Health before they came under our observation.

Eighteen additional cases from which it was impossible to obtain a positive culture presented serologic evidence of infection by *B. dysenteriae.* One of these agglutinated our stock Shiga to a dilution of 1/80, which is held to be significant. Eight gave positive reactions at 1/160, eight at 1/320, and one at 1/1280 for other members of this group.

The fact that most bacteriophages are said to attack only a few strains of a species of bacteria suggested that the presence of a lytic principle in the stool active against *B. dysenteriae* might have some diagnostic value. The findings, however, have been inconclusive. A lysing filtrate was obtained from 10 per cent of ninety control cases and from 34 per cent of seventy-five cases of colitis tested. Four of ten positive controls presented no confirmatory evidence by culture, agglutination, or clinical history. In three instances bacteriophage was associated with positive culture or positive serologic reaction. The two remaining individuals gave histories suggestive of recent mild bacillary infection.

An active bacteriophage was found in sixteen of the colitis cases accompanying positive culture or agglutination. Dysentery bacilli were recovered from only six of these patients. Its presence in ten other cases was not supported by confirmatory evidence of infection.

It is impossible, therefore, accurately to evaluate the significance of bacteriophage. While it is present in a considerably larger number of cases of ulcerative colitis, it occurs frequently in the absence of demonstrable infection by *B. dysenteriae.* Similarly it was found in a small

Table 2

POSITIVE CULTURES

Case No.	Motility Hanging Drop	0.5 Per Cent Agar Stab	Lactose	Glucose	Mannite	Indol	Milk	Top Agglutination in Immune Serum	Top Agglutination in Patient's Serum	Top Agglutination Patient's Serum vs. Stock Antigens
1	0	NC	AL	AL-A	AL	0	A	0	0	0
50	0	CS	AL-A	A	AL	0	A	0	0	0
3	0	NC	AL-A	A	A	+	AC	1/6400	1/320	1/80
63	0	C	AS	A	A	+	AC	1/12,800	1/160	1/80
80	0	NC	AL-A	A	A	+	AC	1/400	0	0
16	0	NC	AL-A	A	A	0	AC	0	0	0
4	0	C	AL-A	A	A	+	AC	1/1600	1/80	1/320
41	0	NC	AL	A	A	+	A-AL	1/800	0	1/40
18	0	NC	AL	A	A	+	A-AL	1/3200	1/80	1/320
44	0	NC	AL	A	A	0	A-AL	1/12,800	1/320	1/320
20	0	NC	AL	A	A	+	A-AL	1/1600	1/640	1/80
32	0	NC	AL	A	A	+	A-AL	1/1600	0	1/160
12	*									1/160
11	*									1/40
61	0	NC	AL	A	A	0	A	1/1280	1/160	1/160
83	0	NC	AL	A	A	+	A-AL	0	1/40	1/160
30	0	NC	AL	A	A	+	A-AL	0	1/160	1/80
18C	0	NC	AL	A	A	+	A-AL	1/200	1/200	0
109C	0	NC	AL	A	A	+	A-AL	1/800		

SYMBOLS

*Organism isolated and identified by New York City Board of Health, not available for study
NC, no clouding
AL, alkaline
A, acid
S, slight
AC, acid and clot
C, following number in column *Case No.* indicates control case.

proportion of the control group apparently free from infection.

DISCUSSION

The results of this investigation seem to augment the evidence of anatomic similarities to bacillary dysentery. The small intestine appears not infrequently to be the seat of structural and functional change of much lesser extent, however, than that encountered in the colon.

Our experience with the agglutination reaction duplicates the difficulties as regards diagnosis which others have encountered. Reference to *Table 2* will show the variability of this factor in individuals from whom dysentery bacilli have been recovered, and will emphasize further the significantly low titre of the patient's serum for stock strains. This probably is partially due to the antigenic complexity of the dysentery group. The obvious necessity, therefore, of the selection of an arbitrary dilution for diagnosis renders such a diagnosis open to question in certain instances. The experience of others which has been quoted, and the selection for this investigation of a dilution higher than they have considered requisite, eliminates diagnostic errors as far as present knowledge permits.

The relatively high proportion of positive cultures obtained from cases of chronic ulcerative colitis calls for some explanatory comment. The reputed lack of viability of the dysentery bacilli in the stools convinced us of the necessity for culturing directly through the sigmoidoscope. And the regard in which MacConkey medium is held in England for these organisms led us to choose it for primary isolation. Furthermore, whenever the patient was sufficiently cooperative, frequently repeated cultures were made over considerable periods of time. The importance of this factor cannot be overemphasized and our experience in *Case 4* amply supports the statement of Fletcher and Mackinnon.[37] Cultures were made through the sigmoidoscope weekly for eighteen weeks before a dysentery bacillus was recovered.

The scarcity of organisms in this instance and the not infrequent absence of homologous agglutinins in the patient's serum again raise the question of the role of the dysentery bacilli in the pathologic and clinical pictures in these cases of ulcerative colitis. Too often, perhaps, the agglutination reaction is considered proof of pathogenicity. It seems more probable that it is an index, not always accurate, of biologic association rather than an indication of the invasiveness of the bacterium, or of the immunity of the host. It has been shown, moreover, that recently isolated strains of *B. dysenteriae* are frequently inagglutinable and that this characteristic in some instances can be changed only by frequent sub-culture through a period of weeks or months. The exact part which these organisms play in the disease cannot be stated, although we hope subsequently to gain information on this point. At present one is not justified in exceeding the statement that a certain number of these patients present positive evidence of chromic infection by *B. dysenteriae*, a group known to be pathogenic to man.

CONCLUSIONS

(1) Forty-two per cent of eighty-three unselected consecutive cases of chronic ulcerative colitis in New York City present cultural or serologic evidence of bacillary dysentery.

(2) Dysentery bacilli were recovered from 20.4 per cent.

(3) Similar evidence of infection by *B. dysenteriae* was found in nine of one hundred and two control cases, of which six presented histories suggestive of mild clinical bacillary infection.

(4) The evidence available does not support the contention of the unitary bacteriologic etiology of ulcerative colitis.

(5) X-ray examination of the small intestine has revealed two forms of abnormality previously unrecognized: a disturbance of the motor function characterized by delay in the progress of the opaque meal with dilatation of certain segments, and structural changes in the wall suggestive of acute exudative inflammation. These findings will be presented in detail in a subsequent report.

ACKNOWLEDGMENTS

The writer wishes to express his deep appreciation to those who have made this study possible, particularly to:

Dr. C. F. Tenney, Medical Director, The Fifth Avenue Hospital, who obtained the necessary financial support.

Professor J. C. Torrey, of the Department of Public Health and Preventive Medicine, Cornell University Medical College, for his advice and assistance in the bacteriology.

Professor E. G. D. Murray, of McGill University, who supplied sub-cultures of his type strains which have been used for the preparation of diagnostic sera and antigens for the Widal reaction.

Dr. Douglas Palmer, of the Gastroenterology Department of the Cornell Clinic, through whose courtesy many of these cases were made available.

BIBLIOGRAPHY

1. Wilks, Sir S.; and Moxon, W.: Lectures on Pathological Anatomy. London: J. & A. Churchill, 1875.
2. Gemmel, J. F.: Idiopathic Ulcerative Colitis. London: Balliere, Tindall & Cox, 1898.
3. Martin, S.: A Text-book of Medical Practice. William Bain, Ed.; Longmans, Green & Co., London, New York, Bombay, 1904.
4. Saundby, R.: Brit. Med. Jour., **1**:1325-1329, June 9, 1906.
5. Hawkins, H. P.: Brit. Med. Jour., **1**:765-770, March 27, 1909.
6. Hurst, A. F.: Ulcerative Colitis. Guy's Hospital Reports, **71**:26-41, Jan., 1921.
7. Rolleston, Sir H.: Lancet, **1**:939-941, May 12, 1923.
8. White, W. H.: On Simple Ulcerative Colitis and Other Rare Intestinal Ulcers. Guy's Hospital Reports, **45**:131-162, 1888.
9. Sopre, H. W.: Ulcerative Colitis. Trans. Amer. Gastroenterological Assn., pp. 160-171, 1927.
10. Brown, T. R.; and Paulson, M.: Chronic Ulcerative Colitis. Internat. Surg. Digest. **8**:67-85, Aug., 1929.
11. Hern, J. R. B.: Ulcerative Colitis. Guy's Hospital Reports, **81**:322-378, July, 1931.
12. Thorlakson, P. H. T.: Ulcerative Colitis. Trans. Amer. Proctologic Soc., **30**:100-110, 1929.
13. Hurst, A. F.: Essays and Addresses on Digestive and Nervous Diseases and on Addison's Anemia and Asthma. New York: Paul B. Hoeber, Inc., 1924.
14. Hurst, A. F.: Proc. Royal Soc. Med., **20**:367-380, Nov. 23, 1926.
15. Hurst, A. F.: Brit. Med. Jour., **1**:693-694, April 25, 1931.
16. Nabarro. Quoted by Hurst, A. F.: Brit. Med. Jour., **1**: 693-694, April 25, 1931.
17. Young, H. M.: Canad. Med. Assn. Jour., **12**:332-333, May, 1922.
18. Dudgeon, L. S.: Lancet, **1**:1006, May 19, 1923.
19. Winkelstein, A.: New York State Jour. Med., **31**:1400-1402, Nov. 15, 1931.
20. Mackie, T. T.: J.A.M.A., **98**:1706-1710, May 14, 1932.
21. Hurst, A. F.: personal communication.
22. Logan, A. H.: Chronic Ulcerative Colitis: A Review of 117 Cases. Collected Papers of the Mayo Clinic, **10**:180-202, 1918.
23. Yeomans, F. C.: Chronic Ulcerative Colitis. J.A.M.A., **77**:2043-2048, Dec. 24, 1921.
24. Torrey, J. C.: Bacteriology of the Human Colon with Particular Reference to Ulcerative Colitis. Trans. 30th Ann. Meeting Amer. Gastroenterological Assn., pp. 129-135, 1927.
25. Bargen, J. A.: personal communication.
26. Paulson, M.: J.A.M.A., in press.
27. Zinsser, H.: A Text-book of Bacteriology. 6th Ed. New York and London: D. Appleton & Co., 1930.
28. Vedder, E. B.; and Duval, C. W.: Jour. Exper. Med., **6**: 181-205, 1902.
29. Flexner, S.: Studies from the Rockefeller Institute, **2**:121-136, 1904.
30. Welch, H.; and Mickle, F. L.: Amer. Jour. Pub. Health, **22**:263-270, March, 1932.
31. Silverman, D. N.; and Harris, W. H.: Amer. Jour. Surg., **15**:515-519, March, 1932.
32. Soule, M. H.; and Heyman, A. M.: Jour. Lab. & Clin. Med., **18**:549-565, March, 1933.
33. Eyre, J. W. H.: Brit. Med. Jour., **1**:1002-1004, April 30, 1904.
34. Martin, C. J.; and Williams, F. E.: Brit. Med. Jour., **1**: 447-448, April 20, 1918.
35. Douglas, S. R.; Colebrook, L.; and Morgan, W. P.: Report Upon a Series of Cases of Dysentery Received from the Mediterranean Expeditionary Force. Med. Research Committee, Sp. Report, Series No. 6. London: H. M. Stationery Office, 1917.
36. Rajchman, L.; and Western, G. T.: Reports upon Investigations in the United Kingdom of Dysentery Cases Received from the Eastern Mediterranean. II. Report upon 878 Cases of Bacillary Enteritis. Med. Research Committee. Sp. Report, Series No. 5. London: H. M. Stationery Office, 1919.
37. Fletcher, W.; and Mackinnon, D. L.: A Contribution to the Study of Chronicity in Dysentery Carriers. Med. Research Committee, Sp. Report, Series No. 29, H. M. Stationery Office, London, 1919.
38. Fildes, P.: Reports upon Investigations in the United Kingdom of Dysentery Cases Received from the Eastern Mediterranean. III. Report upon Recovered Cases of Intestinal Disease in the Royal Naval Hospital, Haslar, 1915-1916. Med. Research Committee, Sp. Report, Series No. 6. London: H. M. Stationery Office, 1917.
39. Dudgeon, L. S.: The Dysentery Group of Bacilli in A System of Bacteriology in Relation to Medicine, Vol. 4. Privy Council. Med. Research Council. London: H. M. Stationery Office, 1929.
40. Murray, E. G. D.: Jour. Royal Army Med. Corps, Oct.-Nov., 1918.
41. Graham, D.: Lancet, **1**:51-55, Jan. 12, 1918.
42. Rogers, L.: Bowel Diseases in the Tropics. London: Oxford Medical Publications, 1921.
43. Winne, C. K.: Studies of the Rockefeller Institute, **2**:118-120, 1904.
44. Ritchie, T. R.: Lancet, **1**:1257-1260, June 24, 1916.
45. Gardner, A. D.: The Dysentery Group of Bacilli, in A System of Bacteriology in Relation to Medicine, Vol. 4. Privy Council Med. Research Council. London: H. M. Stationery Office, 1929.

DISCUSSION (*Abstract*)

Dr. G. R. Callender, Fort Sam Houston, Tex.—Dr. Mackie's work, by its exceptional thoroughness, has done more than any study of the past to clear up the etiology of so-called chronic ulcerative colitis. It is particularly noteworthy that the work is from New York City rather than from an area of high endemicity of bacillary dysentery. As a result of some experiences in searching for carriers of the specific bacilli of dysentery, I would say that Dr. Mackie's findings indicate a considerably higher incidence of these organisms as the etiological agent of the colitis in his cases than his statements suggest. In addition, he has proven that organisms other than the specific bacilli of dysentery are responsible for the manifestations of this disease. This is an important point. In so-called food poisoning aside from that due to *B. Botulinus*, two disease processes are often combined: first, the intoxication due to the ingestion of the products of bacterial action, and second, infection of the colon by the bacteria themselves. Where infection occurs the changes in the mucosa of the colon vary from a simple hyperemia with scant exudate to ulcerations involving the submucosa just as in bacillary dysentery due to Shiga or Flexner organisms. The condition is in fact a dysentery which, under poor treatment, results in the same type of chronic lesions. The character of the lesions in the colon are indicated by the exudate in the stools and furnish the criterion on which to base the character and duration of treatment. I believe that to a very large degree, chronic ulcerative colitis is the result of improper and inadequate treatment and therefore preventable.

Dr. Mackie (closing).—The magnitude of the problem presented by this disease has been clouded by the tendency to eliminate from consideration cases from which definitely pathogenic organisms have been isolated, and to restrict the group to those individuals in whom the etiology remains obscure. This is particularly true of instances associated with infection by *B. dysenteriae*. Chronic dysentery and so-called idiopathic ulcerative colitis present essentially the same clinical and pathologic pictures, and similar complications. It seems probable that *B. dysenteriae* may play a much more important role in the production of chronic ulcerative colitis than is usually recognized. Recovery of the bacilli, however, necessitates repeated cultures taken in most instances, directly from the wall of the bowel. It is impossible at the present time to evaluate exactly the importance of these and other organisms which have been advanced as etiologic factors in the disease.

THE MECHANISM OF PRODUCTION OF CURLING'S ULCER*

By ROBERT KAPSINOW, M.D.,
Lafayette, Louisiana

In 1922, my associates and I reported our observations on a series of extensively burned cases.[1] It was noted that in extensive superficial burns of the body the blood became highly concentrated. This hemoconcentration was regarded as an important factor in the development of many of the clinical signs and symptoms characteristic of burns.

Hemoconcentration is a factor of vital importance in any pathological state wherein it appears. It provokes numerous associated conditions such as a failing circulation, inefficiency of the blood as an oxygen carrier, oxygen starvation of the tissues and finally suspension of circulation and death of the tissues.

The significance of hemoconcentration became more noticeable when a rationale of treatment directed towards reducing the blood to normal concentration was begun. This consisted in the rapid and continuous administration of fluids by all possible channels, with the intravenous and nasal duodenal drip as the avenues of choice. Within a short space of time the hemoconcentration was restored to normal, the blood pressure rose and the maintenance of a normal circulation and heart action was assured. In no case did any untoward sequelae such as delirium, unconsciousness, gastro-intestinal disturbances, ulcers, albuminuria, or hemoglobinuria appear.

As a result of this experience with a large group of cases observed at one time and treated systemically in the same way, irrespective of the site of the burn, it was of particular significance that certain of these dreaded complications did not occur. A group of experiments was undertaken to determine the mechanism of the onset of several of them. This report deals only with the appearance of duodenal ulcers in extensive burns.

All medical students have been taught that burns may cause duodenal ulcer. No mention is made, however, of its frequency. Text-books that discuss it as a complication of burns devote only a few lines to the subject.

Historical.—Although Curling is quoted as having been the first to study intensively and report a series of duodenal ulcers arising in burned patients,[2] actually the condition was described some twenty years previously. In the group reported by Curling, it is interesting to note that the majority of cases were in children under the age of fifteen. Ulcers, however, do occur in adults. In general it is a very uncommon lesion as noted by Ronchese,[3] who found only one case in 348 burned individuals, and Harris,[4] who noted only one in 567 burned cases, the mortality of which was 138. Bancroft and Rogers[5] saw none in 104 cases. Levin[6] mentions 2 cases observed in a large postmortem service. Maes states that there has been no case seen at the Charity Hospital of New Orleans in spite of the fact that it has the largest accident service in the South. The case he[7] reported was the only one observed at the Touro Infirmary.

Pathology.—The Curling ulcer is not different from any other acute duodenal ulcer regardless of its etiology. It may be single or multiple and may appear at any point from the pylorus to the ampulla of Vater. It may vary in size from pin point to a quarter and its shape and depth vary. The longer the acute ulcer persists the more apt it is to take on all the characteristics of the simple chronic peptic ulcer. Perforations, hemorrhage and spontaneous healing occur just as in acute peptic ulcer. It would be absolutely impossible for a pathologist to differentiate the ulcer due to burns from any other acute ulcer of the duodenum. Ulcers may be found in the stomach.

Symptomatology.—The symptoms of ulcer are the same in burns as in all other acute ulcerations of the stomach and duodenum. They are pain and tenderness to pressure in the epigastrium with distress and vomiting. Blood may appear in the vomitus and stools. If the burned area involves the abdomen, there is a tendency to overlook the presence of an acute ulcer until perforation or hemorrhage arises.

Etiology.—Curling believed that these ulcers arose from the arrest of the function of the burned skin,[2] producing a compensation on the part of the glands of Brunner to rid the body of the effete material. The irritation from the over-activity resulted in congestion, inflamma-

*Read in Section on Gastroenterology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933

tion and finally in ulceration in the area containing these glands. With this exception, all other theories advanced to explain the mechanism of Curling's ulcer resolve themselves into circulatory derangement of the nature of emboli, thrombi or stasis or the action of a toxin. Maes says:

"The consensus of modern opinion regards the toxemia of burns rather than the circulatory disturbances as responsible for the production of the associated duodenal u'cers".

It is for this reason, he says, that ulcers are more prone to occur in young subjects in whom toxemia is most marked.

Toxic Theory.—The assumption that death from an extensive superficial burn is due to a toxin elaborated in the burned skin circulating in the blood, has been prevalent for many years. The specific nature of this substance is as diverse as the number of reports on its composition. Each has been discarded for lack of proof. The various toxins mentioned may be found to parallel our increasing knowledge in the chemistry of protein disintegration. At the moment histamine is regarded as the lethal substance. A review of the literature describing the experiments to prove or disprove the presence and the nature of a specific toxin in burned skin will not be undertaken here. Suffice it to say that it is voluminous and serves as a memorial to the ingenuity of the various investigators in searching for the explanation of the cause of death from extensive superficial burns.

Robertson and Boyd[8] were the most recent investigators who claimed the isolation of a toxin. They said that

"the toxin consisted of two portions; one of which was thermostabile, diffusible and neurotoxic, the other was thermolabile, colloidal and necrotoxic. Chemically the toxin consisted of primary and secondary proteoses."

The extract was made from an alcoholic menstrum which later was removed by vacuum distillation at 50° C.

In repeating these experiments, it was impossible to corroborate their findings since normal skin as well as burned skin proved toxic.[9] Analyses of the supposed toxic fraction revealed that what had hitherto been considered the burn toxin was merely alcohol incompletely extracted. This error has been handed down through the literature and is accountable for the toxin theory of today.

Further to disprove the theory of a burn toxin, absorption experiments were conducted. If a toxin were formed, it ought to be absorbed from the site of the burn.[10] This is, however, not the case. Phenolsulphonphthalein injected at the site of the burn was absorbed at the rate of 6 per cent the first hour and 4.5 per cent the second hour. The total phenolsulphonphthalein in the urine after 24 hours was 20.5 per cent as compared with the normal of 48 per cent the first hour and 34 per cent the second hour with a total of 82 per cent for the first two hours.

Large doses of strychnine sulphate were injected at the site of the burn to determine the onset of convulsions as an indication of the absorptive action of a toxin, but no convulsions occurred. No convulsions appeared even when five times the minimum lethal dose was injected. The presence of an unknown toxin that would have a more rapid rate of absorption than strychnine and that would be more potent than strychnine is illogical.

Thermal.—Certain investigators[11] maintain that duodenal ulcers are more frequent in burns of the abdomen than elsewhere. The character of the pathological change is of a nature such as to lead one to assume that the fundamental defect common to all lies in a disturbed circulation in a restricted area. So far as I am aware, little attention has been paid to the possibility that direct heat penetration to the abdominal organ may play a role in this connection. It is not unreasonable to suppose that an elevated intra-abdominal temperature may seriously interfere with the local circulation in the path of direct heat penetration. In rabbits that were burned on the abdomen for only a few seconds, the intra-abdominal temperature rose rapidly to 110° F., while the rectal temperature never rose above 102° F. Different portions of the abdominal cavity exhibited various temperatures, depending on the distance from the site of the burn. Most, if not all, the macroscopic appearances that have been described as characteristic of burns have been noted in the experimental animal. This is only true when the abdomen is burned. If the region burned is remote from the abdomen no abdominal pathology is present except congestion of the viscera. The congestion observed under these conditions may be explained on the basis of an altered circulation due to a markedly concentrated blood.[12]

Stasis Due to Blood Concentration.—It is to the highly concentrated blood in man after extensive superficial burns that the chief detri-

mental systemic effects have been ascribed. In the rabbit, a similar blood condition exists. The concentration of the blood increases rapidly after the first three or four hours after the burn. The fluid leaves the capillaries to enter the injured tissue. The increase in hemoconcentration depends upon the extent of the injury and upon the available free water in the tissues that can be used to overcome the mounting blood concentration. The longer the hemoglobin is above 125 per cent of normal the graver the prognosis. The relative frequency of duodenal ulcers in children is not really due to the fact that they are more susceptible to the supposed toxin, but rather to the difficulty of maintaining a normal concentration even with the introduction of adequate volumes of fluids in burns.

Microscopic examination of the edema mass under the burned skin in the rabbit frequently presents a bizarre picture. The capillaries are widely dilated and seem to branch like the limbs of a tree from the main vessel. These terminal branches are densely packed with aggregations of red blood corpuscles. In more extreme cases the capillaries present pocket-like projections filled with corpuscles. Occasionally the engorgement is so great as to rupture the capillary. In any event the rupture of the capillary results from the engorgement of the earlier stage. This same picture was frequently found when the stomach or the colon was injured by the direct penetration of the heat. These were the animals that demonstrated ulcers and one is led to believe that the sequence of events as described plus the stasis associated with asphyxia results in ulcer formation. In the experimental animal, if fluids are forced, to produce a reduction in the blood concentration from the start so that the blood can circulate through the injured area, the frequency of these ulcers is decidedly less.

SUMMARY

As a result of extensive blood concentration, stasis with rupture of the capillaries underlying the duodenal mucosa producing an inefficient oxygen supply to the tissue, causes a necrosis of the mucosa and the typical picture of Curling's ulcer. Direct heat penetration produces in the experimental animal acute ulcers of the gastrointestinal wall immediately underlying. A toxin theory does not explain the absence of ulcers in equally burned cases. Were a toxin the cause of these ulcers, they should be a more frequent observation.

BIBLIOGRAPHY

1. Underhill, F. P.; Carrington, G. L.; Kapsinow, R.; and Pack, G. T.: Arch. Int. Med., 32:31, 1923.
2. Curling, T. B.: Med. Chirur. Tr., London, 25:260, 1842.
3. Ronchese, F.: Riforma Med., 40:753, 1924.
4. Harris, R. I.: Brit. Jour. Surg., 16:677, 1929.
5. Bancroft, F. W.; and Rogers, C. S.: Trans. Amer. Surg. Ass'n., 44:258, 1926.
6. Levin, J. J.: Brit. Jour. Surg., 17:110, 1929.
7. Maes, U.: Ann. Surg., 91:527, 1930.
8. Robertson, B.; and Boyd, G. L.: Jour. Lab. & Clin. Med., 9:1, 1923.
9. Underhill, F. P.; and Kapsinow, R.: Jour. Lab. & Clin. Med., 16:8, 1931.
10. Underhill, F. P.; Kapsinow, R.; and Fisk, M. E.: Amer. Jour. Physiol., 95:315, 1930.
11. The literature on this subject has been reviewed by Pack, G. T. Arch. Path. Lab. Med., 1:767, 1926.
    Pack, G. T.; and Davis, A. H.: Burns. Philadelphia: Lippincott, 1930.
12. Underhill, F. P.; Kapsinow, R.; and Fisk, M. E.: Amer. Jour. Physiol., 95:305, 1930.
13. Ibid.

DISCUSSION (*Abstract*)

Dr. Louis Levy, New Orleans, La.—Long, of Liverpool, first described this condition in the "London Medical Gazette." Moynihan gives him credit in the following words: "The first to describe with full knowledge the occurrence of duodenal ulcer was neither Curling nor Dupuytren but Long, who published a paper in 1840." Curling's paper appeared in 1841, yet his name is universally associated with this condition.

In the experimental proof of the Curling's ulcer mechanism, I note that John H. Fitzgibon reports two cases of Curling's ulcer with recovery, in which the general treatment of ulcer was instituted, with no special reference to combating concentration of body fluids.

Maes mentions a case where there is more than a suspicion of Curling's ulcer following a cauterization of the cervix by Leonard and Dayton, where the area of burn is not larger than the size of a silver dollar. One would not suspect a burn of this size to cause much concentration of the blood stream.

Moynihan regards the ulcer as toxic, and points out that it practically never occurs unless there are septic changes in the burned area. DaCosta says that if reports are correct, ulcers following burns are rarer than formerly, and that the application of asepsis is probably responsible for their present infrequency. The question also arises whether there were no ulcers of the duodenum before the burns, and whether or not the burns were an exciting cause of an active inflammation which might be attended by the complications of bleeding and perforation.

Levin explains localization, "as all duodenal ulcers are explained today, by the tortuosity of the vessels of the lesser curvature of the stomach and first part of the duodenum, and their relatively poor anastomosis rendering them more liable to thrombosis."

The incidence is 6 per cent or more. The ulcers occur most frequently in young children, and twice as frequently in females as in males. Perforation may occur between the fifth and twentieth days, and is most common on the tenth and eleventh, although cases have proven fatal as early as four and one-half days, and as

late as thirty days. Keath mentions a case of a child of six years who lived seventy-five days. However, the maximum frequency is regarded as fifteen days. Summation of histories shows that the ulceration is rarely preceded by symptoms, and ends speedily in the death of the patient.

Dr. Kapsinow gives no reason why these ulcers should occur in the duodenum. Yet he doubts the theories that they are caused by gastric juice digestion, emboli, bile irritation, reflex inhibition of the intestinal circulation, or toxemia. He opens a new view with the blood concentration theory. If this is the cause of duodenal ulcers following burns, we at last have some definite plan for the treatment of burns.

Methods used to keep the stream nearly normal, such as drips, hypodermoclysis, Matas' drop method of infusion, and duodenal nasal drips, should be used after burns, besides the tannic acid treatment, with special care for its hydrogen-ion concentration.

Dr. A. A. Herold, Shreveport, La.—We cannot question Dr. Kapsinow's general conclusions, but I contend that he does not disprove the old idea of the etiology of Curling's ulcer, namely: that the bile takes on some of the activity of the destroyed skin area, excreting certain waste matter in its stead, which makes the bile more irritating to the duodenum and more liable to cause ulceration. This idea is supported by the fact that burns of large area are more liable to have this complication than deeper burns involving less surface and also by the fact that the favorite site for Curling's ulcer is at the ampulla of Vater, where the bile enters the duodenum. Dr. Kapsinow's idea of the importance of increasing the fluid content of the body also fits in with this, for, by so doing, we dilute the body fluids, including the bile, which renders it less irritating.

To sum up, then, while I feel sure that Dr. Kapsinow has come to the right conclusions in his work, I do not feel that the old idea of Curling's ulcer has been disproven.

Dr. Kapsinow (closing).—As to whether the gastric or biliary secretions may play a role in the formation of Curling's ulcer during the period of hemoconcentration, I have at present only a few scattered hints. During the period when the blood is becoming concentrated, all body fluids are necessarily depleted to assist the blood in maintaining itself at normal concentration. The flow of bile into the duodenum practically stops and that which is in the gallbladder even is more concentrated than normal. Likewise, the gastric juice becomes reduced in volume but the digestive power of the gastric juice is just as high. The little juice which is present and which enters the duodenum is apparently not neutralized by the duodenal or pancreatic fluids. It is conceivable that the duodenal mucosa with its impoverished circulation due to the hemoconcentration, may more readily fall victim to the digestive powers of the gastric juice. In some experiments which I reported wherein the biliary flow was diverted through the right kidney, I was able to produce a fairly large number of peptic ulcers in the duodenum, apparently due solely to the action of unneutralized gastric juice.

A CLINICAL INVESTIGATION OF INCIDENCE OF RHEUMATIC HEART DISEASE IN A SUBTROPICAL CLIMATE*

By E. W. Bitzer, M.D.,
and
Geo. L. Cook, M.D.,
Tampa, Florida

Statistical studies of rheumatic fever and its complications are necessarily inaccurate, principally because its cause is unknown. Errors in diagnosis are frequent on account of the varied manifestations of the disease and the wide range in the severity of cases. The difficulties of diagnosis are greater in adults than in children, though there are many cases in children in which a definite diagnosis cannot be made. In adults the clinical differentiation of rheumatic fever and infectious arthritis is often impossible and pathologists[1] admit there is no definite line of demarcation.

A study of the present status of the bacteriology of this disease forces one to the conclusion that it is caused either by several members of the streptococcus group or by some factor as yet unknown.

Poynton's[2] belief that the *Streptococcus viridans* is the cause not only of rheumatic fever, but also of subacute bacterial endocarditis and chronic infectious arthritis, has not been generally accepted. Liban[3] has shown that there are very important differences in rheumatic endocarditis and subacute bacterial endocarditis. The efforts of Small[4] to prove that the *Streptococcus cardioarthritides* is responsible for rheumatic fever has not been entirely successful. The numerous types of streptococci found in these cases by many observers[5] have resulted in an effort to explain the phenomenon on an allergic correct basis. Berkhaug[6] has reported a high percentage of skin reactions to the various types of streptococci in rheumatic fever and chronic arthritis cases. Lowenstein[7] has suggested that a tuberculous bacillemia may be the etiological factor in these cases and that the joint symptoms are all allergic reaction.

It is estimated[8] that in England 2 per cent of the children between 5 and 13 years show

*Read in Section on Pediatrics, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

definite evidence of juvenile rheumatism and 1 per cent develop rheumatic carditis. The report of the Registrar General[9] for England and Wales from 1921 to 1923 showed a death rate from valvular heart disease of 36.1 per 100,000 in the upper and middle class and 80.9 in the unskilled laborers. Five per cent of the admissions at the Montreal General Hospital[10] during a period of three years were for acute articular rheumatism or its complications. Kaiser's[11] extensive study in school children in Rochester, New York, showed in 20,000 tonsillectomized children an incidence of rheumatic fever of 1.9 per cent, chorea 0.4 per cent, carditis 2.2 per cent, and in 28,000 non-tonsillectomized children the incidence of rheumatic fever was 3 per cent, chorea 0.5 per cent and carditis 2.9 per cent. White[12] reported in 2,314 cases of organic heart disease 36.1 per cent, or 836 cases of rheumatic origin. Examination of children in ten Philadelphia public schools[13] showed an incidence of heart disease of 0.69 per cent in the elementary schools and 1.11 per cent in the high schools. Coffen,[14] of Portland, Oregon, in a study based on 13,258 medical cases, found 18, or 0.11 per cent, of acute rheumatic heart disease, and 552, or 4.9 per cent, of chronic rheumatic heart disease. In a series of 915 heart cases, which did not include any doubtful cases, Stone and Vanzant,[15] of Galveston, Texas, reported 7.3 per cent rheumatic heart disease, and 1.5 per cent subacute bacterial endocarditis. Seventy-seven and six-tenths per cent of the rheumatic cases occurred in whites, in spite of the fact that heart disease was found to be 1.8 times more common in the negro race. In Malay[16] in 150,000 patients not a single case of rheumatic fever, chorea or mitral stenosis was observed.

THE INCIDENCE OF RHEUMATIC HEART DISEASE AND RHEUMATIC FEVER IN FLORIDA

The statistical data for this study are derived from two sources: first, from the Bureau of Vital Statistics of the State Board of Health (Stewart G. Thompson, Director), covering the whole State; second, from case histories in private practice and from hospital records.

It is well known that state board of health statistics are not of great value in studies of this type, but are sufficiently accurate to give a general impression of the situation.

Deaths from arteriosclerotic, syphilitic and hypertensive heart disease are uncommon before the age of forty years. Cardiac deaths between three and forty years are largely from the rheumatic group. Thayer[17] states that 72 per cent of the deaths in rheumatic heart cases occur prior to twenty years of age.

The death rate from cardiac disease in Florida is increased by the many elderly people with arteriosclerotic and hypertensive heart disease who visit the State, and the higher incidence of organic heart disease, due to a large negro population.

Table 1

DEATHS FROM ORGANIC HEART DISEASE IN FLORIDA 3 TO 39 YEARS OF AGE, INCLUSIVE

Year	White	Negro	Total	Total Deaths, All Causes
1925	114	129	243	16,832
1926	116	138	254	20,029
1927	99	151	250	18,143
1928	92	142	234	18,932
1929	81	138	219	18,155

Table 1 shows the total cardiac deaths in whites, under 40 years of age, to be 502 and in colored, 698, in a five-year period. Negroes form 29 per cent of the total population of Florida. It is known that rheumatic heart disease is more common in whites than in negroes. The total deaths from heart disease in 1929 was 2,502, 14 per cent of all deaths. The rate per 100,000 population was 174.8.

The second group, composed of cases from private practice and hospitals situated in Tampa, is exclusively white and is diversified from the standpoint of the economic status of the individuals. The following tabulation shows the number of rheumatic cases and allied conditions in 14,096 admissions to the Tampa Municipal Hospital. It is certain that a considerable percentage of the chronic valvular cases did not originate in the State. Approximately 0.06 per cent of the admissions were acute rheumatic fever cases.

Table 2

CHRONIC VALVULAR HEART CASES AND ACUTE CARDITIS IN 14,096 ADMISSIONS TO THE TAMPA MUNICIPAL HOSPITAL

Chronic rheumatic valvular disease	12
Acute rheumatic endocarditis	1
Chronic scarletinal valvular disease	1
Acute pneumococcic endocarditis	2
Chorea and endocarditis	1
Puerperal sepsis with endocarditis	1
Endocarditis	1
Subacute bacterial endocarditis (viridans)	5
Staphylococcic pericarditis	1
Rheumatic fever cases	4
Chorea	3

AN ANALYSIS OF 176 AUTOPSIES

The following analysis of 176 autopsies, compiled by Dr. Herbert R. Mills, Pathologist of

the Tampa Municipal Hospital, is a tabulation of the cases of endocarditis and pericarditis:

Table 3

I Endocarditis
- (a) Rheumatic, none
- (b) Subacute bacterial, 3
- (c) Acute bacterial
  - (1) Complicating pyemia, 1
  - (2) Complicating lobar pneumonia, 2
  - (3) Complicating streptococcus meningitis, 1
- (d) Terminal, associated with sarcoma of the ovary with metastasis, 1
- (e) Old valvular defects
  - (1) Chronic endocarditis
    - (a) Probably rheumatic, 3
    - (b) Etiology undetermined, 2; both probably arteriosclerotic

II Pericarditis
- (a) Serous
  - (1) Hydropericardium, secondary to cardiac decompensation, etc., 33
  - (2) Associated with lobar pneumonia, 4
  - (3) Associated focal suppurative nephritis, 1
  - (4) Associated bronchopneumonia, 3
  - (5) Associated bronchitis, 1
  - (6) Associated influenzal encephalitis, 2
  - (7) Associated general peritonitis, 1
- (b) Serofibrinous
  - (1) Associated with lung abscess, 2
  - (2) Associated with malignancy
    - (a) Lymphosarcoma with metastasis to heart, 1
    - (b) Bronchiogenic carcinoma with metastasis to heart, 1
    - (c) Adenocarcinoma of kidney with metastasis to heart, 1
- (c) Fibrous
  - (1) Rheumatic in origin, 3
  - (2) Tuberculous, 2
  - (3) Cause undetermined, 3 (of these, two cases had carcinoma of the lungs)

Of the three cases of old valvular defects, probably rheumatic in origin, one patient was born in Georgia and came to Florida at the age of six weeks. Another was born in Germany and came to the United States at the age of 42. The other was born in Philadelphia, but the records do not state at what age he came to Florida.

Table 4 shows the cardiacs in 3,345 complete examinations. These cases were almost entirely adults, seen in private practice, and the records were all made by the same examiner. Practically all were ambulant and examined in the office. Approximately 35 per cent of these cases lived in Florida prior to fifteen years of age.

Table 4

CARDIAC CASES IN 3,345 PHYSICAL EXAMINATIONS

Coronary thrombosis	35
Arteriosclerotic heart disease	142
Angina pectoris	73
Essential hypertension	351
Thyroid heart disease	10
Beri beri	1
Congenital heart disease	16
Cardiac neurosis	115
Chronic nephritis	19
Syphilis of the heart and aorta	17
Pneumococcus endocarditis	1
Rheumatic heart disease	44
Streptococcus hemolytic endocarditis	1
Total	825

In the essential hypertension group are included all proven cases of essential hypertension and hypertensive heart diseases. The arteriosclerotic heart group contains all who had normal or low blood pressure. The angina pectoris group includes all cases of this type regardless of blood pressure. The chronic nephritis group comprises only those cases that were primarily nephritics.

A careful history of infections of the rheumatic fever group was obtained in all these cases. The state or country in which the disease was contracted was noted, with the duration of the residence in the State of Florida. The following tabulation shows the geographic origin of the rheumatic heart cases.

Table 5

Contracted in	North	South	Florida
Aortic regurgitation	1	1	1
Aortic regurgitation and mitral stenosis	1	2	1
Aortic regurgitation and mitral regurgitation	2	0	0
Mitral stenosis	12	5	2
Mitral regurgitation	2	2	2
Rheumatic endocarditis without residual valvular lesions	4	1	3
Adhesive pericarditis	1	0	0
Subacute bacterial endocarditis following rheumatic endocarditis	0	1	0
Totals	23	12	9

The incidence of chronic rheumatic valvular disease contracted in Florida in this group is 0.26 per cent. The total incidence of rheumatic endocarditis is 1.31 per cent.

RHEUMATIC HEART DISEASE IN CHILDREN

An examination of 8,530 case records of children three years of age and above, from the Children's Hospital and Clinic and the Tampa Preventorium, showed two cases of rheumatic endocarditis that made complete recoveries and showed no residual valvular heart disease. The only case of chronic valvular heart disease was found in a boy twelve years of age, who had a mitral and aortic involvement, with a history of polyarthritis. The incidence of rheumatic heart disease in this group was 0.035 per cent.

COMMENT

There is a feeling among clinicians who are interested in this problem that there is a marked difference in the incidence of rheumatic heart disease in the northern and southern sections of this State. In the southern section of the State rheumatic endocarditis occurs, but is rarely followed by serious valvular disease. One of the authors in 25 years of practice in this commu-

nity has seen only two cases of acute rheumatic endocarditis that were responsible for serious chronic valvular disease. One of these patients was 25 years of age and the other 12 years. In both, this was the only attack. During the period of this investigation no acute cases were observed in either children or adults that were followed by valvular defects. It is worthy of note that the findings in this series suggest that infection occurs at a later period in life and is rarely of the acute form. It is felt that the cause is primarily due to the absence of cold weather and to the fact that changes in temperature are not marked in this climate. The abundance of sunlight undoubtedly plays some part and the fact that the residents are able to lead a more out-of-door life.

SUMMARY

(1) A five-year summary has been made of the total cardiac deaths of the State of Florida of patients between the ages of three and thirty-nine years, inclusive.

(2) A list is presented of the chronic valvular heart diseases and acute carditis in 14,096 hospital admissions.

(3) An analysis has been made of 176 cases of endocarditis and pericarditis which came to autopsy.

(4) A tabulation is presented of the cardiovascular diseases in 3,345 cases in private practice with the geographical origin of 44 rheumatic heart cases.

(5) The incidence of rheumatic heart disease is noted in 8,530 children from three to fourteen years of age, inclusive.

BIBLIOGRAPHY

1. Jordan, Edwin P.: Arch. Path., **10**:79, July, 1930.
2. Poynton, Frederick J.: Osler's Modern Medicine, **2**:165, 1925.
3. Rothchild, M. A.; Sacks, B.; and Libman, E.: Amer. Heart Jour., **2**:356, April, 1927.
4. Small, James Craig: Jour. Lab. & Clin. Med., **14**:1144, Sept., 1929.
5. Swift, Homer F.: Hekteon Lecture. J.A.M.A., **92**:2071, June 22, 1929.
6. Berkhaug, K. E.: Jour. Inf. Dis., **44**:363, May, 1929.
7. Reitter, C.; and Lowenstein, E.: Wien. Klin. Wchnschr., No. 10, p. 283, March 4, 1932.
8. Hill, N. Gray: Brit. Jour. Child. Dis., **27**:161, July-Sept., 1930.
9. Wright, Wade: Amer. Heart Jour., **4**:448, April, 1929.
10. Howard, C. P.; and Mills, E. S.: Canad. Med. Assn. Jour., **19**:403, 1928.
11. Kaiser, Albert D.: J.A.M.A., **89**:2239, Dec. 31, 1927.
12. White, Paul D.: and Jones, T. Duckett: Amer. Heart Jour., **3**:303, Feb., 1928.
13. Cahan, J. M.: J.A.M.A., **92**:1576, May 11, 1929.
14. Coffen, T. H.: Amer. Heart Jour., **5**:99, Oct., 1929.
15. Stone, C. T.; and Vanzant, Francis R.: J.A.M.A., **89**: 1473, Oct. 29, 1927.
16. Clarke, J. Tertius: Brit. Jour. Child. Dis., **26**:99, June, 1929.
17. Thayer, W. S.: Ann. Int. Med., **5**:247, Sept., 1931.

DISCUSSION (*Abstract*)

Dr. C. C. McLean, Birmingham, Ala.—Statistical studies are not always a true index of the incidence of a disease in a given locality. Statistics are usually compiled by one individual, from the observations of many, and often the incidence of the disease, in the given locality, will vary as much as from widely scattered areas. Dr. Cook, in compiling statistics, has shown that rheumatic heart disease is not unknown in a subtropical climate.

In Tampa, rheumatic heart disease occurs in a moderate per cent of cases, but probably not to the extent that it is found in certain other Southern cities.

The death rate in Florida from heart disease is comparable to that of Alabama and other Southern states. In Florida, in 1929, the death rate from heart disease was 174 per 100,000 population; in Alabama, 136 per 100,000 population.

Tables 2 and *3* are very interesting, showing that rheumatic heart disease in Tampa is three times greater in the native Floridan and seven times greater in non-native Floridans, in private practice, than in hospital admissions. This is just the reverse of what is found in private practice and hospital work among children in Birmingham, Alabama.

In *Table 3*, from private practice, of 3,345 physical examinations, a diagnosis of rheumatic heart disease was made in 44, or 1.31 per cent of the cases. Of the 3,345 cases, approximately 35 per cent lived in Florida before they were fifteen years old. The incidence of rheumatic heart disease in this group was 9, or 0.77 per cent, while the incidence of rheumatic heart disease in those patients who moved to Florida after the age of fifteen years was 1.6 per cent, being about twice as common as in the native Floridans.

The statistics submitted indicate that rheumatic heart disease is 22 times greater in native adults in Florida than in children.

It might be of interest to the members of the Association to see lantern slides showing the incidence and type of rheumatic fever and rheumatic heart disease seen during the past ten years in white children, admitted to the Children's Hospital in Birmingham, Alabama.

The percentages to be given are not a true index as to the incidence of the disease in Birmingham, but are from routine hospital cases. The diagnosis of the rheumatic conditions were not made by one individual, but by eight different pediatricians.

From January 1, 1922, to July 1, 1932, of 4,852 admissions of children between the ages of 3 and 13 years to the Children's Hospital in Birmingham, Alabama, a diagnosis of rheumatic fever was made in 122, or 2.5 per cent, of the patients. Of the 122 rheumatic fever cases a diagnosis of cardiac disease was made in 83.6 per cent, arthritis 19.6 per cent, chorea 15.5 per cent. Of the 102 cases with cardiac disease, 79 had cardiac disease alone; 12 cardiac disease with mild arthritis; 11 cardiac disease with chorea. Of the 102 cardiac cases there was definite hypertrophy of the heart in 60.8 per cent and decompensation in 23.5 per

cent. The mortality for rheumatic heart disease in the hospital was 10.8 per cent.

In the comparison, in children of corresponding ages, of the incidence of arthritis, chorea and cardiac disease associated with rheumatic fever in 122 cases in Birmingham, Alabama, and 372 cases in New York City, it was found that arthritis was 46 per cent and chorea 26 per cent greater in New York City than in Birmingham, Alabama; cardiac disease was 4 per cent greater in Birmingham than in New York City. The incidence in which the cardiac disease was the only manifestation of rheumatic fever was 52 per cent greater in Birmingham than in New York City.

In answer to a questionnaire mailed to Charity Hospital, New Orleans, Dr. Edgar Hull says: "In view of the fact that rheumatic heart disease constitutes upward of 10 per cent of the cases of organic heart disease admitted to the Heart Station of this hospital, it would appear that rheumatic fever in its varied manifestations is quite common in Louisiana."

Dr. Douglas VanderHoof, of Richmond, Virginia, in answer to a questionnaire, says: "During the ten years 1914 to 1923, inclusive, we have examined 9,985 patients. In that number we had 7 cases of acute rheumatic fever and one of these patients had mitral stenosis. Also among these 9,985 patients there were 48 instances of mitral stênosis. Of these 48 cases there was a history of acute arthritis in 15 and of chorea in one."

The varied manifestations, complications and sequelae often associated with rheumatic fever in the North are more common in the South than is generally recognized. From an analysis of the case records from the Children's Hospital, Birmingham, Alabama, it was found that rheumatic fever in its varied manifestations was practically as common as in the hospitals of Baltimore, Boston and New York, but the character of the disease is not precisely the same, for arthritis in a severe form is certainly not common in Birmingham, and arthritis even in a mild degree occurs in only a moderate proportion of cases. Cardiac disease, on the other hand, is extremely common.

In the South, if rheumatic fever were considered a disease primarily of the heart, and every patient presenting early manifestations of a rheumatic infection were considered a potential cardiac patient, and managed accordingly, the incidence, mortality and chronic invalidism from rheumatic heart disease would be greatly reduced.

Dr. Cook (closing).—There is no doubt of the fact that rheumatic fever occurs in subtropical climates. The discrepancy between the incidence of cases in children and in adults can most reasonably be accounted for by the fact that probably the acute attacks, in childhood, were too mild to attract the attention of the parents, or require a physician's care. It is certainly true that of the cases in adults, which have been diagnosed, few have given a history of polyarthritis.

Undoubtedly sunshine and higher temperatures play some part in the low incidence of rheumatic carditis, but it is possible that there are other factors which have not yet been determined.

PNEUMOCOCCIC PERITONITIS*

By JOHN H. LYONS, M.D.,
Washington, District of Columbia

HISTORICAL INTRODUCTION

Nearly a hundred years ago, French writers described a form of peritonitis which was found predominantly in little girls and which they designated as "idiopathic" or "cryptogenic." The distinguishing feature of this peritonitis was the spontaneous eruption of pus through a break in the abdominal wall, usually at the navel. During the two years, 1884-1886, when Fränkel and Weichsel were proving that the *Diplococcus pneumoniae* was a pathological human bacterium, Camillo Bozzolo, of Turin, Italy, in 1885, found pneumococci with well-formed capsules in the pleural and peritoneal exudate of a young man who exhibited symptoms of peritonitis following acute nephritis. This was the first report of capsulated cocci in the pleural and peritoneal cavities of a living human being. Subsequently the term pneumococcal or pneumococcic replaced the old idiopathic peritonitis, but a search of medical literature even in recent times leads one to the conclusion that the etiology, diagnosis, and therapy of the condition are not much nearer solution than they were when the clinical symptoms were first recognized. The International List of Causes of Death does not give pneumococcic peritonitis a separate and distinct category, but combines this disease with other primary forms. The same procedure is followed in the handbook of instruction published by the Vital Statistics Division of the Census Bureau. Hence no separate statistics on the incidence of or mortality from pneumococcic peritonitis are available. The questions: how does pneumococcic peritonitis originate, how shall it be treated, are scarcely nearer to authoritative, conclusive answers than they were when the obscure origin of this disease was dismissed as "cryptogenic."

Pneumococcic peritonitis is of especial interest because of its relatively rare occurrence, its age and sex selectivity, its high mortality rate, and the great uncertainty which has existed with regard to the portal of entry of the pneumococcus. References to it in medical journals are frequent, particularly in France and Germany.

*Read in Section on Surgery, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

The frequency of laparotomy since 1890, when Nélaton performed the first laparotomy for pneumococcic peritonitis, has added many anatomical findings to the clinical picture. Primary and secondary, diffuse and circumscribed, acute and chronic forms have been differentiated. The predominant types of causative pneumococci have been established. Four possible modes of infection have been proposed, and the pros and cons of surgical intervention have been debated. But the medical profession is still relatively helpless when confronted by this disease.

The rarity of pneumococcic peritonitis is perhaps the chief reason for this helplessness. The symptoms are readily confused with acute appendicitis, and often the surgeon is only aware of a deviation from appendical peritonitis when he finds the characteristic copious greenish-yellow, odorless, purulent exudate in the peritoneum, with large and numerous flakes of fibrin. This condition is most frequently found in little girls between two and twelve years of age. Since the mortality from pneumococcic peritonitis is high, variously placed between 40 and 100 per cent, the disease deserves to have as much light as possible thrown upon its obscurity.

CAUSATIVE AGENT

Type I and *Type II* pneumococci have been found to be the most common bacterial agents in pneumococcic peritonitis, and of the two, *Type I* is the more frequent (Eck and Gundel; Cruickshank). This finding is what one might expect, since *Type I* pneumococci are most frequently found as the bacterial invaders in the pneumonia of young people. Pneumococcic peritonitis appears to be growing more frequent in France; it is relatively common in Germany and Switzerland; but it is much rarer in England and the United States. It is reasonable to assume a variation in incidence of the disease which would depend on national and sectional differences in the prevailing forms of pneumococci and their virulence as well as on seasonal changes (Cruickshank; Blacklock and Guthrie).

INCIDENCE

Some authorities argue that pneumococcic peritonitis is much more common than is generally recognized. McCartney and Fraser place the incidence of the disease as representing 2 per cent of all abdominal emergencies, and consider it twice as frequent among young girls under fourteen years old. Many gastro-intestinal disturbances found in connection with pneumonia and infections of the upper respiratory tract may represent extremely mild forms of pneumococcic peritonitis which are transitory and never necessitate surgical operation. For some time it was supposed that as a primary infection pneumococcic peritonitis was to be found only in females. But discovery of several cases in males with the same clinical and pathological characteristics has shown that no one sex or age group can claim exclusive immunity. Females, however, constitute about 75 per cent of the cases (Bréchot and Nové-Josserand) and girls of approximately seven years of age are the most susceptible (McCartney).

In the last seven years there have been six cases of pneumococcic peritonitis at the Children's Hospital in Washington. These represent only 0.03 per cent of the total admissions, 26,742, during this period. Except for the low rate of incidence, this group corresponds in a general way with other published groups. All of the cases were apparently of the so-called primary type. Three of the children were white and three were colored. There were five girls and one boy. This boy was admitted with the diagnosis of nephrosis and died seventeen days later with pneumococcic peritonitis, confirmed by autopsy. Holt and McIntosh have called attention to the relatively frequent occurrence of pneumococcic peritonitis in children with nephrosis, but cannot explain it. Of the six cases at Children's Hospital five died; one recovered. The recovery occurred in one of the two cases not operated upon.

CLASSIFICATION

Attempts have been made to differentiate and classify the various forms of peritonitis from which pneumococci may be isolated. First of all, the condition is described either as primary (that is, the sole discernible pneumococcic lesion in the body) or secondary to some other pneumococcic infection which antedates it. This classification is obviously quite arbitrary. To begin with, pneumococci are not normal inhabitants of the peritoneum, so even a primary manifestation of their presence must be "secondary" to some mode of entry, yet its secondary character with respect to other pneumococcic infections is difficult to establish positively except by postmortem investigation. Even in autopsies it is often difficult to determine which focus is earlier in point of time, and, with possible variations in the resistance of different tissues, the pneumococcus may travel over many routes and leave no clear signs of its trail.

Primary and secondary forms of pneumococcic peritonitis are further subdivided into diffuse (general) and circumscribed (localized) forms. There is confusion in this terminology also, for some authorities consider localized and general peritonitis as distinct clinical entities caused by a mild or more virulent pneumococcus, respectively, whereas other writers hold that they represent stages in the same infection. Salzer thinks that the diffuse stage lasts for about 48 hours and that the infection is subsequently walled off by fibrin and thus localized. Obadalek believes that the infection starts with local irritation at the ileocecal angle and then spreads gradually to the whole peritoneum. Acute and chronic forms are also terms that have been used to differentiate general from circumscribed pneumococcic peritonitis.

MODES OF INFECTION

The confusion in terminology is paralleled by the diverse theories of the origin of pneumococcic peritonitis. There are four possible routes by means of which the peritoneum may be invaded, namely:

(1) The lymphatic system
(2) The female genital tract
(3) The gastro-intestinal tract
(4) The circulatory system

Each possible portal of entry has had its supporters who, in their desire to prove their theories, have excluded all other possible modes of infection. I shall mention briefly each of these theories.

In view of the fact that lymph circulates away from the peritoneal cavity toward the thorax, the lymphatic origin of the infection may be readily discarded, even as a working hypothesis. The theory has had few adherents.

The vaginal source of infection was first suggested in 1901 by Brun and finds its most vehement advocates in McCartney and Fraser, whose discovery of the same type of pneumococcus in the vagina and peritoneal pus of patients with primary pneumococcic peritonitis gave strong clinical support to their theory. Purulent vulvitis is often found associated with pneumococcic peritonitis. According to McCartney, the vagina of little girls of the poorer classes (among whom pneumococcic peritonitis is most prevalent) becomes infected by unhygienic habits and the scant protection of the outer genitals afforded by inadequate clothing. He ascribes the age selectivity of this form of peritonitis to the fact that in warm weather little girls two and seven years of age sit almost naked on common stairways and pavements which receive frequent pollution from promiscuous spitting. Younger children are kept wrapped up and are unable to walk about; other children spend more time in school. He found pneumococcic peritonitis more common in warmer weather, reversing the seasonal variation in the incidence of pneumonia. On the basis of his findings and his ability to produce pneumococcic peritonitis in one instance by vaginal infection of a monkey, after he had made the normally acid vaginal secretion slightly alkaline, McCartney contends that primary pneumococcic peritonitis is found solely in females and that the vagina is the portal by which the bacteria enter.

The genital theory is exploded, however, for men and boys also have primary pneumococcic peritonitis with identical clinical and pathological findings, and for them some other mode of infection must be postulated. Age and sex are beyond doubt predisposing factors, but a theory based solely on this predisposition must perforce lose weight when a single exception is observed and verified. In scientific thinking an exception proves the non-existence of the rule rather than the contrary.

The gastro-intestinal theory is attractive because of the location of the infection, the involvement of the intestines, and the diarrhea exhibited in the earliest stages of the illness. According to this theory, of which Obadalek is the most enthusiastic modern protagonist, pneumococci enter the digestive tract with ingested sputum or polluted food. They find a fertile soil for multiplication in the cecal end of the ileum where an obstruction of the intestinal contents is possible. They pass through the wall of the intestine, first infect the peritoneum in the right lower quadrant, and later spread to create a diffuse, generalized peritonitis. Obadalek's anatomical findings are well in accord with his theory, and he was able to induce a similar diffuse pneumococcic peritonitis in guinea pigs by means of intraperitoneal injections of small quantities of feces from children with this disease. His control experiments with the feces of patients with peritonitis due to a perforated appendix were negative, thus proving the presence of virulent pneumococci in the stools of pneumococcic peritonitis.

But this at once raises the question: why should the pneumococcus, which is normally deprived of all its virulence by the acidity of the

gastric juice and by solubility in bile, suddenly be enabled to create such widespread havoc? Some lesion, some chemical change, or some physiological abnormality must be the instigating cause of pneumococcic peritonitis to break down the normal resistance to infection. Moreover, what of the age and sex differences? As Obadalek points out, the intestinal theory of origin requires the further assumption of an age and sex susceptibility to the pneumococcus, and likewise hepatic insufficiency as a contributing cause of the infection. He also hints that the more complicated structure of the female peritoneum may offer a more suitable, less resistant field for the colonization of pneumococci. He believes that the vulvitis which is frequently present is due to fecal contamination.

By a process of elimination, the blood stream is left as a vehicle of infection. Some investigators have and some have not found pneumococci in the blood in pneumococcic peritonitis. Michaut, in 1901, and von Brunn, in 1903, propounded the theory of hematogenous origin, which has had many advocates among French writers and has been supported by Fricke in the United States. The fact that the infection in secondary pneumococcic peritonitis is usually blood-borne lends weight to an application of this theory to primary cases. But, like the intestinal route, it requires an explanation of the abnormal local susceptibility of the peritoneum. Pneumococci of less virulent types have been found in the blood of healthy individuals. Pneumonia rarely produces peritonitis except in a terminal septicemia. Perhaps only biochemists and biophysicists will be able to solve the problem of the obscure predisposing factors which may lead to this grave disease. Blood stream or lymph, or possibly both, are undoubtedly carriers of pneumococcic infection, for metastases of pneumococcic peritonitis do occur. Weil and Mouriquand (quoted by Bréchot and Nové-Josserand) have observed pneumococcemia in very young children before the onset of pneumonia and before the appearance of the radiological triangle, a phenomenon which they believe does not occur in adults. The question of local immunity established by various tissues has not been thoroughly investigated; the transmutation of types of pneumococci or variations in their virulence under local conditions is perhaps a possibility. Let us hope that the future will provide a thoroughly adequate explanation of the mode of infection in pneumococcic peritonitis.

We have thus had a brief survey of the conflicting opinions associated with the pathenogenesis of pneumococcic peritonitis. In my opinion, the chief difficulty in establishing a clear-cut theory of origin lies in the fact that the adherents of any one theory feel that they must strengthen their arguments by denying the possibility of any other source of infection. It is probable that all possible portals of entry may, in one case or another, serve as entrances for the pneumococcus.

SYMPTOMATOLOGY

The symptoms of pneumococcic peritonitis closely parallel those of acute appendicitis and differ on the whole more in degree than in kind. The onset is usually sudden; violent pain is felt in the abdomen, accompanied by nausea, vomiting, and as a rule, diarrhea. The temperature is high, the pulse rapid, and the prostration severe. The face is usually flushed. Herpes labialis is at times noted. The abdomen is frequently distended, tender all over, but especially sensitive to pressure in the right lower quadrant; muscular resistance is noted, but is not board-like. The leukocyte count is frequently as high as 30,000 with 80 to 90 per cent polymorphocytosis. Blood cultures often give pneumococci and these bacteria can sometimes be recovered from the spinal fluid (Fricke). Purulent pneumococcic vulvitis is frequently present. The chief contrast to appendicitis lies in the diarrhea, which is often profuse with fetid, soft, greenish or yellowish brown stools which may also be glairy and streaked with blood (Mathieu), and the severity of the general symptoms.

In the anamnesis there are frequently histories of slight colds or indiscretion of diet. Sometimes a period of general malaise precedes the onset of the symptoms, but as a rule the patient has had no previous warning. The severity of the symptoms and absence of conclusive signs of other conditions are perhaps the chief diagnostic aid. It is small wonder that most cases of pneumococcic peritonitis are referred to the surgeon as acute cases of appendicitis.

DIAGNOSIS

But the treatments indicated for appendicitis and for pneumococcic peritonitis are, according to most authorities, diametrically opposed. In

the one instance we have an offending organ to excise, in the other nothing to remove, no leak to stop. Opening the abdominal cavity, manipulation of the peritoneum, added to the effects of anesthesia, may be just enough to break down the last resistance. But early operation is imperative if an appendix is acutely inflamed, and unless a conclusive differential diagnosis can be established almost immediately, abstention from surgery may be fatal.

Many workers have favored early operation with profuse drainage. But American surgeons advocate conservative treatment, on the whole, and in Germany, Salzer has recently made an eloquent plea for deferring surgical intervention. He favors abdominal puncture under ethyl chloride anesthesia for all dubious cases seen within 48 hours of the onset of illness. Everything is prepared and held ready for laparotomoy if the immediate bacterial analysis of the abdominal exudate reveals no pneumococci. He claims that he has reduced his fatalities in diffuse peritonitis by this procedure, which, however, is applicable only to the first 48 hours of illness. After that period the formation of fibrin may be disturbed by the puncture and the value of puncture may be disturbed by the formation of fibrin.

Since the pelvis minor is often the first site of the infection, puncture of the Douglas pouch as an aid in differential diagnosis is recommended by Loewe, who considers the abdominal puncture dangerous. The relative possibility of injury to the intestines or to the uterus in the respective methods of procedure is debatable.

PROGNOSIS

In the light of confusion in terms used to classify the various forms of pneumococcic peritonitis and the diametrically opposed methods of treatment recommended or employed, it is unwise to consider crude mortality rates as indicative of all conditions. It is likewise impossible to adjust these rates to allow for differences in type and form of peritonitis and method of treatment.

Rohr, in a survey of 192 cases which in 1911 he was able to classify into separate groups of children (under 16 years of age) and adults (over 16), male and female, circumscribed and diffuse, operated upon and not operated upon, recovered and died, makes the following observations: 67 cases of circumscribed pneumococcic peritonitis occurred among children under 16 years of age and 22 cases were among older persons, a ratio of 3 to 1. Of the children, 66 were operated upon with 6 fatalities and 1 unknown outcome, while 1 case healed with the spontaneous escape of pus through the navel. Of the 22 circumscribed cases among older persons, 18 underwent operation with 2 fatalities; the 4 who had no operative intervention all died. There were 61 cases of diffuse pneumococcic peritonitis among children in the series, as against 42 among older persons, a ratio of 3 to 2. Only 30 of the children with diffuse peritonitis were operated upon; 22 of these died and 8 recovered. (Among the fatalities was one child whose abdomen was punctured.) The 31 unoperated cases all died. In the older age group, 18 of the 42 persons were operated upon with 15 fatalities and 3 recoveries; the 24 who were not treated surgically all died.

When both types of pneumococcic peritonitis, both age groups, both sexes, and both types of treatment are lumped, the total mortality rate in Rohr's series is 44.5 per cent. This figure is of the same order of magnitude as the following crude rates from other sources which are based on the analysis of a large number of cases, namely: Konnecke, 55 per cent; Jensen, 64 per cent; Fraser and McCartney, 42 per cent; Rischbeith, 88.8 per cent. Thus it appears that whatever the mode of treatment, pneumococcic peritonitis is a grave condition, especially when in the diffuse stage or diffuse form.

THERAPY

Occasional enthusiastic outbursts in favor of serum therapy with specific type antigens are to be found in the literature, but when analyzed they boil down chiefly to a general impression that the method works well in pneumonia, so it probably would be advantageous in pneumococcic peritonitis. Proponents of the waiting policy advocate the administration of sera, fluids, salines, glucose, together with blood transfusion, to build up the patient's resistance to the point where the infection may be localized and subsequently incised and drained (Duncan).

Personally, if I were able to diagnose a case of diffuse pneumococcic peritonitis without operation, I would give supportive treatment and administer the appropriate serum, hoping that the infection would pass into the localized stage when a drainage operation could be performed.

Animal experiments on the course of induced diffuse purulent pneumococcic peritonitis, with and without serum therapy, would perhaps offer conclusive evidence of the value of this form of treatment. In the absence of comparative mortality statistics, it is impossible to form a judgment on this point.

When Barrington-Ward read a paper on pneumococcic peritonitis before a meeting of the

British Medical Society in 1932, he said that he hoped the discussion would throw some light on the use and value of sera. Serum therapy, however, was not mentioned in the reports of subsequent expression of opinion. Perhaps today I shall be more fortunate in eliciting the results of your experience.

BIBLIOGRAPHY

Annand, W. Fraser; and Bowen, W. H.: Lancet, **1**:1591, 1906.
Barrington-Ward, L. E.: Brit. Med. Jour. (London), pp. 704-706, Oct. 15, 1932. Discussion of paper, Ibid., pp. 257-258, Aug. 6, 1932.
Besold, F.: Zentrallbl. f. Gynak., **56**:2114-2118, 1932.
Bodman, Frank: Brit. Med. Jour. (London), **1**:1023, 1928.
Bozzolo, Camillo: Centrallbl. f. klin. Med., **6**:177-178, 1885.
Blacklock, J. W. S.; and Guthrie, K. J.: Jour. Path. & Bact., **36**:349-368, 1933.
Brechot, A.; and Nove-Josserand: Jour. de Chir., **38**:533-564, 1931.
von Brunn, Max: Beitr. z. klin. Chir., **39**:57-112, 1903.
Conklin, Stanley D.: Penn. Med. Jour., **34**:91, 1930-31.
Cruickshank, Robert: Lancet, p. 621, March 25, 1933, and p. 680, April 1, 1933.
Duncan, J. H.: Canad. Med. Assn. Jour., **24**:778-784, 1931.
Eck, T.; and Gundel, M.: Deutsch. Zeitschr. f. Chir., **236**:137-146, 1932.
Elkin, D. C.: Arch. Surg., **18**:745-753, 1929.
Fricke, Erich: Amer. Jour. Surg., N. S., **8**:48-53, 1930.
Holt, Emmett: Diseases of Infancy and Childhood, 1933.
Imrie, H. D.; and McDonald: Jour. Med. Assn. South Africa, **2**:90, 1928.
Jensen, Jorgen: Arch. f. klin. Chir., **69**:1134, 1903; **70**:91, 1903.
Jones, H. C.: Va. Med. Month., **54**:233-237, 1927-28.
Herde, Anna: "Uber Pneumokokkenperitonitis," Diss., Kiel, 1918.
Langer, Max: Zentrallbl. f. Chir., **60**:1128, 1933.
Lipschutz, B.; and Lowenburg, H.: J.A.M.A., **86**:99-104, 1926.
Loewe, Otto: Kinderarztl. Prax. (Leipsig), **3**:200-204, 1932.
McCartney, J. E.: Jour. Path. & Bact. (Edin.), **26**:507-517, 1923.
McCartney, J. E.; and Fraser, J.: Brit. Jour. Surg. (London), **9**:479-489, 1921-22.
Mathieu, P.: Irish Jour. Med. Sci., 6th Series, pp. 623-629, 1929.
Michaut, Ch.: Thesis, Paris, 1901.
Michaut, Ch.: Gaz. d. hop., **74**:361, 1901.
Montgomery, Albert H.: Surg., Gyn. & Obst., **41**:799-803, 1925.
Nelaton, Ch.: Bull. med., 1890.
Obadalek, Walter: Deutsch. Zeitschr. f. Chir., **233**:589-617, 1931.
Obadalek, Walter: Zentrallbl. f. Chir. (Leipsig), **59**:1101-1103, 1932.
Rischbieth, Harold: Quart. Jour. Med., **4**:205, 1910-11.
Rohr, Fritz: Mitteil. aus d. Grenzgeb. d. Med. u. Chir., **23**: 658-738, 1911. Also, Diss., Jena, 1911.
Salzer, Hans: Wien. med. Wochnschr., **82**:1454-1455, 1932.
Wolfsohn, Georg: Med. Welt (Berlin), **4**:1755-1758, 1930.
Wolfsohn, Georg: Zentrallbl. f. Chir. (Leipsig), **59**:209, 211, 1932.

DISCUSSION (*Abstract*)

Dr. William B. Marbury, Washington, D. C.—The importance of pneumococcic peritonitis lies not in the fact that it is unusual, but that it must be differentiated from a very common abdominal condition which also carries a high mortality. I refer to peritonitis secondary to appendicitis.

Dr. Lyons has emphasized the difference of opinion as to its etiology. The principal argument seems to center around whether the infection comes by extention from the intestine or through the blood stream. The idea that it is an upward extention from the vagina is intriguing, but hard to substantiate. Kirchoff, in 29 cases (all females) could get only seven positive pneumococcic cultures from the vagina. Koennecke thinks that the vagina is contaminated from the rectum.

In favor of its being a blood-borne disease is the fact that positive blood cultures are frequent, and that it is commonly associated with bronchitis, tonsillitis, middle ear infection and whooping cough.

The extention theory is supported by Jensey ("Keen's Surgery"), who gave 2 mice and 2 rabbits 10 c. c. of pneumococcus culture. One developed a fibropurulent peritonitis without perforation. He also found pneumococcus in 2 cases of perforated gastric ulcer.

Pneumococcic peritonitis must be differentiated from appendicitis and alimentary intoxication. The sudden onset with high leucocytosis, high fever, marked distention, moderately soft abdomen, diarrhea, herpes, and the fact that the patient looks less ill, help to distinguish it from appendicitis. Diarrhea is a common symptom with alimentary intoxication, but the leucocytosis and temperature of pneumococcic peritonitis should help to distinguish it. The treatment centers around the question as to early or late operation, but there is no general consensus of opinion. Obadalek advises early operation, insisting that there is everything to be gained and nothing to be lost by this. He thinks the cases that go on to localization and empyema are chronic from the beginning. It is impossible to know which ones will localize. In spite of this it is noted that Obadalek's best results were in those operated upon about the fourth or fifth day following the onset. McCartney and Frazer found little difference between early and late operation, but were able to reduce their mortality 10 per cent by blood transfusion.

In the last analysis one must not forget that there is little absorption from the peritoneum after the peritonitis has existed 48 hours as shown by David's experiment on dogs, and that distention is probably our worst enemy. Wilkie cautions against allowing distention to continue and insists that both the peritoneal cavity and gut should be drained when there is distention from fluid and gas.

Dr. Joseph T. Buxton, Newport News, Va.—My personal experience with this condition has been extremely limited, since I have seen only two cases in recent years. Hence my remarks are influenced almost entirely by the rather scanty literature on the subject. I agree heartily that since the condition was first recognized there has been a very disappointing advance in our knowledge of how to handle it, especially in view of its high mortality.

Of the four possible routes of infection, namely: through (1) lymphatics; (2) female genital tract; (3) gastro-intestinal tract; and (4) the blood stream, it would seem to me that the last two have the weight of evidence in their favor. However, all four have their supporters and experimental evidence to back them. The most severe blow to the genital theory is the fact that this condition has been found in males as well as females. It may be that all four are utilized as avenues of entrance at one time or another.

From the standpoint of symptoms and diagnosis I believe that the most important point is to differentiate this condition from acute appendicitis. This is much more easily said than done and can never be done with certainty without entering the peritoneal cavity. But the important points in the history, physical findings and laboratory data brought out in this paper certainly give us several points of difference on which to base the diagnosis. I cannot but feel that if there is any doubt, operation is indicated because delay in case of appendicitis may possibly end fatally.

In the early acute stage where there is no frank purulent exudate but where plastic adhesions are being formed as a protective mechanism, I believe that operation is contraindicated, for there is no pus to be drained, and in the procedure the protective adhesions mentioned above would be separated and trauma added to an already overburdened organism, thus promoting general involvement of the entire abdomen and facilitating the entrance of the infecting organisms and their products into the blood stream.

Therefore, in spite of those who advocate early drainage operations, a policy of watchful waiting while utilizing the usual well known supportive measures would seem to me the best course. All the observers, however, agree that in the so-called chronic stage with circumscribed abscess formation, incision and drainage should be employed.

My study of the literature was extremely disappointing in view of the few references to treatment with serum therapy. It would seem to me that especially in view of the fact that most of these cases are *Type I* and *Type II*, specific sera would be of great value, but reports and statistics on serum treatment are rather conspicuous by their absence.

Of the two cases seen by me since 1929, one was in an eight-year-old girl and was of the so-called secondary type, following pneumonia. The physician in charge thought this complication to be appendicitis and told the family that she was too ill to stand operation. When she entered the hospital a week or more later a localized abscess had formed. This was drained and after a rather stormy convalescence the patient recovered. Bacteriological study revealed pneumococci.

The second case was in a sixteen-year-old girl who was stricken suddenly with severe generalized abdominal pain, nausea and vomiting. There was no diarrhea. On admission to the hospital she was critically ill; the entire abdomen was rigid with most of the tenderness localized at the umbilicus. There were 40,100 leukocytes with 92 per cent polymorphonuclears. Operation was deemed advisable with a diagnosis of probable ruptured appendix. On entering the abdomen a large amount of hemorrhagic fluid was seen and the peritoneum and viscera were covered with a fibrinous exudate. In addition the abdominal viscera were studded with small indurated nodules. Bacteriological study of the exudate revealed pneumococci. The patient died the following day and autopsy and microscopic examination revealed both a tuberculous peritonitis and a pneumococcic peritonitis.

THE MANAGEMENT OF FRACTURES OF BOTH BONES OF THE LEG*

By RANDOLPH L. ANDERSON, B.S., M.D.,
Charleston, West Virginia

The discussion in this paper is limited to simultaneous fractures of the shafts of both the tibia and the fibula, excluding those fractures just below the knee and around the ankle joint.

The objectives are two: first, to emphasize the importance of a careful diagnosis of the type of fracture present in the tibia before treatment is instituted. It is taken for granted that the type of fracture in the fibula is unimportant. Secondly, I wish to summarize the various methods of treatment which may be used.

A careful diagnosis of no type of case can be made without a history. Probably the most important facts to determine are: (1) the type of violence, (2) the time of the accident, and (3) the age and general health of the patient.

In the present age of fast-moving machinery, direct violence is more commonly the cause of fractures of the leg than indirect violence. In fractures caused by direct violence, this violence is often so great that more or less comminution of the fragments follows. However, even in automobile accidents, indirect violence is not uncommon because of the frequency with which legs are twisted after the initial impact of the accident. As is well known, indirect violence almost invariably gives rise to a spiral or oblique fracture of the tibia with usually a fracture of the fibula at a higher level.

Therefore, I feel that I am correct in saying that spiral, oblique, and comminuted fractures are the common types and that a true transverse fracture of the tibia with a single fracture line and with the bone broken squarely and straight across now rarely occurs.

The time interval between the accident and the beginning of treatment is important not only in compound fractures, but also in simple fractures. Local anesthesia in the hematoma is easily obtained a short while after the accident, but it becomes difficult to obtain anesthesia after a long interval. Also, greater difficulty of reduction is encountered after a long interval.

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

The age and general health of the patient must be taken into consideration before the type of treatment is decided upon.

The more unfavorable this age-general-health quotient, the more useful a local anesthetic becomes and also the more imperative it is that some type of treatment be adopted which does not confine the patient to bed for a long period.

The general condition of the patient at the time of the accident must be taken into consideration in dealing with the fracture. If internal injuries are suspected concomitant with the leg fracture, or if the patient is in shock, definitive treatment for the leg fracture must be delayed. Therefore a thorough general examination should be made with special emphasis on the chest and abdomen, the pulse and blood pressure.

The legs are examined gently for deformity, shortening, the presence of a hematoma, the presence of a compounding wound and of injury to nerves and blood vessels.

The x-ray picture is the most important diagnostic aid that we have, of course. This should be made before any attempt at reduction in all cases, with the possible exception of compound fractures in which treatment might be delayed in waiting for it.

The x-ray picture should always include the whole leg from ankle joint to knee joint in at least two planes. It is with this examination that we are particularly concerned. Frequently the antero-posterior view shows a fracture of the tibia which superficially appears to be a straight transverse break. The line goes directly across at right angles to the axis of the leg. However, if we examine the x-ray pictures more critically we will observe that adjacent to the fracture line there is a distinct thinning of the bone in both fragments. This is due to a splitting of the bone in the longitudinal axis of the bone. This splitting often is not clearly brought out in the lateral view. It is usually brought out better in a good antero-posterior view. It would be of considerable help in doubtful cases to take a series of views, for instances antero-posterior, lateral and oblique views.

Also, certain oblique fractures give the impression that serrated edges are present which will enable the operator to reduce and hold the fragments in apposition. Usually this is a snare and a delusion, because practically all so-called oblique fractures are really spiral fractures. This would be brought out usually by a series of x-ray pictures.

I recall very distinctly a case seen by me some time ago. It was my impression that this fracture could be reduced and held reduced because of certain rough points in the fracture line which would keep the bone in apposition. A reduction was attempted, a conventional plaster cast was applied and the roentgenologist congratulated me on the result obtained. Subsequently, to my chagrin the fragments slipped gradually. An open operation was performed later which demonstrated that the fracture of the tibia was a perfect spiral type and, of course, impossible to hold reduced without traction.

Of course, the x-ray picture of a comminuted fracture is obvious and needs no comment.

In the treatment, the first question that arises is that of the type of anesthetic to be used. Böhler, Carother and many others have used a local anesthetic injected into the hematoma successfully. I have used it in a few cases satisfactorily. This is especially applicable to fractures of the leg, since the displaced tibial fragments can be easily palpated and the hematoma is readily outlined. It is at times somewhat difficult to inject the fibular hematoma successfully, however.

Local anesthesia can be successfully used in all fractures of both bones of the leg in all cooperative patients, whether children or adults. It should be given also to all patients in whom there is an element of shock or in whom there is some question of associated injuries.

Spinal anesthesia I have used very seldom. It can be employed to advantage especially in compound fractures where one might hesitate to infiltrate a soiled field with novocaine.

General anesthesia is to be used in nervous or uncooperative patients.

In my experience it is practically impossible to reduce any displacement of tibial fragments without anesthesia.

After the question of anesthesia has been decided, we come to the method of reduction. These fractures may be reduced either by angulation of the fragments into position or by traction. The method of reduction by angulation needs no elaboration.

There are various methods of traction. Manual traction and countertraction is probably the least effective. Also, the Hawley table with a clove hitch about the ankle may be used. The

Böhler frame with a clove hitch around the ankle may be used. Vertical traction may be used with the knee bent over the back of a chair or over a frame such as the one described by J. W. Martin. In this method weights may be tied on to a heavily padded clove hitch.

Here, however, as elsewhere, skeletal traction is more effective even if used only in the reduction of the fracture. Either the Kirshner wire or the Steinman pin may be used. Of the two, the Kirshner wire is probably preferable because it is smaller, does less tissue damage and is easier to put in and to take out. The traction may be applied through the os calcis or through the lower tibia, preferably the latter. The Böhler frame is useful if skeletal traction is to be used to obtain reduction. The Martin frame, in which the traction is vertical, should probably be equally good. I have had no experience with this frame, however.

So far in the discussion we have assumed that we are using traction in order to reduce the tibial fragments, following which we shall apply a plaster cast. There is no question that the non-padded cast holds fragments better than a padded cast. I do use a small pad, however, under the heel and along the lower course of the Achilles tendon. I have not bivalved the casts in those patients kept in the hospital unless there was circulatory disturbance.

It is only in the cases in which we are absolutely sure from the x-ray examination that we are dealing with a strictly transverse fracture that we can apply a plaster cast and remove the traction with safety. In all other cases, continuous traction in some form should be employed.

Kennedy, of New York, made some interesting observations in his analysis of 107 cases treated at the Beckman Street Hospital. In this series, among ten cases of spiral fractures treated by manipulation and plaster, seven later required traction or operation. In twenty-two cases in which the fractures were either comminuted or supposedly transverse and which were treated first by manipulation and plaster, traction or operation was used later in ten cases. I believe that if other clinics published their results using manipulation and plaster, the findings would be similar.

Böhler uses the skeletal traction method for reduction and retains his traction in a Braun splint with weights after applying a non-padded plaster cast from the toes to the knee. White has an ingenious method in which he uses two specially prepared bicycle spokes for traction above and below the point of fracture, which he incorporates into the cast, thus retaining the traction in the plaster. Eikenbary has a similar method in which he uses Kirshner wires. Carter uses Kirshner wires and the Marburg distraction apparatus. For these latter methods, specially prepared traction bows must be used.

Other men use skeletal traction and apply a splint in place of plaster. Weight traction is used either in the Thomas leg splint with a Pearson attachment or in the Braun splint. Lindsay and McKeon, in their excellent series, used Thomas splints.

Open reduction has no place in the treatment of these fractures unless other methods have failed.

If it is convenient, the fluoroscope is used to check the position of the fragments if any method of reduction is to be used. However, it is not wise for the operator to expose his hands promiscuously under the fluoroscope, and it should be used simply as a check upon what has been done. A portable x-ray may be satisfactorily substituted.

The average time for union of fractures of both bones of the leg is between two and twelve weeks. Many cases take much longer.

The average time necessary for traction in these cases is between four and six weeks. So, in cases in which traction and a splint are used the patient is hospitalized for that period. Then a plaster cast is applied, which is kept on four to six weeks longer. The other cases can usually leave the hospital in about one week after they have become comfortable.

All cases should have an x-ray examination every three or four weeks to check the progress.

A walking iron may be incorporated in the plaster cast if plaster has been used. Pitkin and others allow the patient to walk almost immediately. I have not allowed the patient to bear weight before four weeks.

One of the chief advantages of the traction and splint method is that baking and light massage can be begun almost immediately. This means that function of the ankle and knee joints is returned more quickly and also there is much less muscle atrophy.

Compensation and clinic records show that the results in fractures of both bones of the leg have not been good. It is only by sifting out

the good methods from the bad that we improve our results.

SUMMARY

(1) A true transverse fracture of the tibia is seldom seen in fractures of both bones of the leg.

(2) All fractures of the leg except transverse fractures should be treated by some type of traction.

BIBLIOGRAPHY

Carter, R. M.: Wire Traction in Fractures of the Lower Extremity. Surg., Gyn. & Obst., **55**:213-220, Aug., 1932.
Eikenbary, C. F.; and Lecocq, J. F.: Fractures of Tibia and Fibula. Jour. Bone & Joint Surg., **15**:643, July, 1933.
Kennedy, R. H.: Fractures of the Shaft of Both Bones of the Leg. Ann. Surg., **93**:563-586, Feb., 1931.
Lindsay, M. K.; and McKeown, R. M.: Skeletal Traction with Steinman Pin: Results Obtained in Fifty-Two Cases of Fractures of Both Bones of the Leg. Surg., Gyn. & Obst., **56**: Feb., 1933.
Martin, J. W.: Treatment of Fractures of the Bones of the Leg. Surg., Gyn. & Obst., **56**:1047-1051, June 19, 1933.

DISCUSSION (*Abstract*)

Dr. W. K. West, Oklahoma City, Okla.—Skeletal traction is the ideal method of treatment of severe fractures. If skeletal weight traction is used a portable bedside x-ray unit is essential, as it is impossible to estimate the exact amount of weight to be used. One may use either too little weight with imperfect reduction or excessive weight with a resulting loss of contact and the possibility of non-union.

Dr. John E. Cannaday, Charleston, W. Va.—I am glad that Dr. Anderson has taken the floor in behalf of skeletal traction in the treatment of fracture of both bones of the leg. In my opinion, this form of traction constitutes one of the very greatest advances in the treatment of these fractures.

When in Tucson, Arizona, last winter, I had the privilege of looking at some healed long bone fractures that had been treated by the prehistoric medicine men of that section. True, they had shortening but the positions in the main were good, and doubtless the limbs functioned well. The results were almost as good as some that I have seen that have been treated by some worthy members of our own profession. Apparently the art of splinting in that locality and time was very well known. Our methods should have made some progress since that time.

I have been making use of skeletal traction in selected cases of long bone fractures for the past twenty years and have had no cause to regret it. I began by using the Codivilla nail, the Finochietto stirrup, the Steinmann pin, later using caliper traction for several years, but now I prefer the Kirschner wire method. I might say that I have sometimes had cause to regret not using skeletal traction. What is often needed in case of long bone fractures is either replacement with fixation or real traction which restores length and stabilizes the parts. We should not deceive ourselves with make-believe methods.

Dr. H. Earle Conwell, Fairfield, Ala.—Dr. Anderson has selected for discussion a certain group of fractures of the tibia and fibula, which should have been treated by skeletal traction. I am sure he has not intended to leave the impression that all fractures of the tibia and fibula should be treated this way, nor has he intended to say that in certain fractures of the tibia and fibula open reductions are not indicated.

Of course, everyone realizes that the majority of fractures of the tibia and fibula can be and should be reduced by the closed manipulative method and placed in a circular plaster cast or some form of fixation from the thigh down to the base of the toes. This treatment, however, does not always apply to the compound fracture of the tibia and fibula or the severely contused leg with a fractured tibia and fibula whether the fracture be simple, transverse, spiral or comminuted, with or without overlapping. Each fracture is a law unto itself demanding the best common sense, practical and expert judgment obtainable through the surgeon treating that individual case. There is no panacea for the treatment of any fracture.

I am inclined always to use skeletal traction where it is indicated before attempting open reduction. However, in a very small per cent of cases one is inclined to do and probably should do an open reduction before attempting skeletal traction. This type of case is very rare and is generally a case in which the fracture is very near the knee or ankle joints.

Skeletal traction is not without its disadvantages and possible complications. There is always a possibility of infection about the wire or nail, which of course should not occur. (2) Too prolonged traction should be avoided because it brings about a certain paralysis to the muscles which is hard to overcome. (3) Over-extension of the fragments occurs sometimes which will cause a delayed or non-union.

In using skeletal traction the maximum weight should be applied in the beginning while the patient is relaxed. Extend the lower fragment, watch it until coaptation has taken place with the proximal fragment, and then commence gradually to remove the weights, making sure, of course, that no overlapping takes place. As soon as alignment and good reapposition of the fragments and sufficient callus formation have taken place apply a circular cast or some form of fixation while the extension is being carried out to the extremity. When this fixation has been properly secured, remove the skeletal traction.

Skeletal traction is not fool proof by any means and every surgeon using it should perfect himself in its management. It takes just as good a surgeon, if not a better one, to use skeletal traction and prevent an open reduction than to rush in and do unnecessary open reductions, which often result in delayed or non-unions and possible amputations. It is not always the use of the scalpel which governs the ability of a surgeon but the judgment as to when it should be used.

Dr. Anderson (closing).—I had no intention of condemning open operation. However, I do feel that conservative traction measures should practically always be tried first and that, in case of failure, the open operation should be performed.

I am sure that skeletal traction gives me better results in the usual case than the reduction and cast method. Of course, however, if the fracture is strictly transverse, the reduction and cast method is always to be preferred.

RURAL HEALTH ORGANIZATION IN THE UNITED STATES: PAST, PRESENT AND FUTURE*

By ALLEN W. FREEMAN, M.D.,
Baltimore, Maryland

The need for providing health organizations to serve the rural districts of the United States has long been recognized. The Commonwealth of Massachusetts, as early as 1797, provided by law for the establishment of town boards of health, and Connecticut followed with a similar law in 1805. These early examples were not soon imitated. By the middle of the Nineteenth Century only two other states, Michigan and Wisconsin, had taken similar action.

Beginning with 1850, a considerable number of states attempted to meet the need either by the organization of town, village, township or county boards of health, or by authorizing the governing boards of these units to perform health functions. These laws were for the most part permissive. In the absence of any state or national agency to promote such organization, the actual formation of rural health boards proceeded but slowly. In New York State, for example, although the enabling act was passed in 1850, the State Board of Health, organized in 1880, noted in its first annual report that in the entire State, boards of health had been organized in "twenty towns and in about double that number of villages."

The organization of state boards of health, beginning with Massachusetts in 1869 and proceeding very rapidly for the next two decades, gave the first real opportunity either for determining the health needs of the rural communities or for stimulating the organization of suitable agencies to meet these needs. At the first meeting of the American Public Health Association in 1873, a paper on "The Need for Sanitary Organization of Villages and Rural Districts" was presented by Dr. Ezra Hunt, of New Jersey, and references to the same needs are to be found in almost all state board of health reports for this period.

The forms of organization designed for the health service of rural areas at this period were very simple. They conformed to the general plan of rural government in operation at the time, and took into account the economic, social and physical conditions, especially those of transportation, then existing. They were of necessity planned to meet the disease problems then recognized and to apply the preventive measures then known to be of value.

Rural life in the United States in the last quarter of the Nineteenth Century was a thing vastly different from what it is today. The governmental system had not changed essentially since its first establishment. A typical county government still consisted, as has been said, of the court house and jail. The schools were usually conducted by district units quite independent of the general county government. Township and village governments were concerned largely with roads and public relief. The farm was still essentially a self-contained economic and social unit and the condition of the roads and of the means of transportation localized communication and activity within narrow geographic limits. The diseases recognized as capable of attack by preventive measures were few in number. Smallpox, diphtheria and scarlet fever were regarded as of most importance. Endemic typhoid was not believed to be preventable, nor was tuberculosis.

In general, the countryside was regarded, on the basis of comparison with the deplorable conditions then existing in the cities, as essentially healthful. The prevention of epidemics of communicable disease was the real objective of the health service. The means of prevention known to be applicable were simple; vaccination against smallpox, quarantine of infected premises, and those simple measures of general cleanliness which were comprised in the word "sanitation."

The organization planned by the early health administrators, therefore, provided only for the emergencies presented by epidemics or threatened epidemics of communicable disease. It recognized no need for any continuing service except that necessary to insure a reasonable degree of environmental cleanliness. These emergency needs could be met only by some agency near at hand and readily available. The plan devised, therefore, provided that the governing body of the smallest existing unit of general government, whether county, town, township or village, be authorized either to appoint a local board of health or health officer, or to exercise the necessary health functions directly.

*Read before Southern Branch, American Public Health Association, meeting conjointly with the Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*From the Johns Hopkins University, Baltimore.

Between 1850 and 1900, thirty-five states had made some provision of this kind, and by 1910 there was some provision for local health service in every state of the Union. In most states the law provided that only physicians could serve as local health officers or that one or more of the members of boards of health must be physicians. In some states no board was provided and the local health officer was not required to be a physician.

It is no criticism of the sanitary statesman of the last quarter of the Nineteenth Century to recognize the fact that this system of local health administration was outmoded even before it was generally put into operation. No one could have foreseen that, in the twenty-five years during which the system was being set up, the whole scope, method and objective of preventive medicine was to undergo complete revolution. There was rapid decline in the prevalence of those diseases which were most important. Typhoid fever, tuberculosis, syphilis and malaria were added to the list of preventable diseases. Infant and maternal mortality were recognized as preventive problems of major importance. The idea that health promotion as well as disease prevention is the proper function of government was generally accepted. These things, added to the economic and social changes of the period, and the improvement in transportation and communication, so altered our conceptions of rural health service that the old organization was wholly unsuited to the new need.

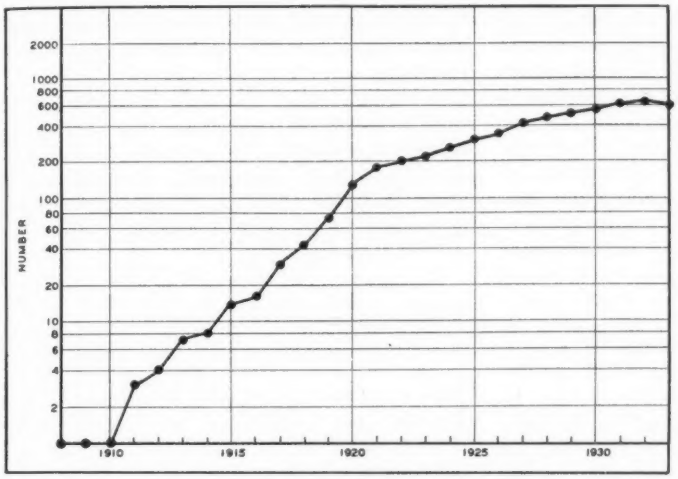
It is fortunate that these profound changes were accompanied, during the first decade of the present century, by a radical and almost nationwide reorganization of the system of state health administration. Without this far-reaching improvement in state health departments, it would have been difficult or impossible successfully to attack the problem of rural health organization. In almost every state, as soon as the state department of health was placed on a satisfactory footing, efforts were made to improve both the quality and the amount of rural health service.

It was, however, out of the efforts to prevent hookworm disease and typhoid fever in the rural areas of the Southern United States that the modern movement in rural health administration really developed. Workers with both diseases early became convinced that effective measures of control could not be inaugurated or conducted by the then existing system of county boards of health. There was obvious and urgent need for the establishment in the rural areas of health departments which would be comparable in scope and organization with those already existing in the cities.

These ideas were already beginning to find practical expression. The sanitary needs of the suburban areas in counties in which were located large cities had already demanded action. In Kentucky, as early as 1908, the Health Officer of Jefferson County, in which is situated the City of Louisville with its wide suburban areas, had found it necessary to devote his whole time to his work, and had been provided with a staff of sanitary inspectors. In June of 1911 the City of Charlotte, in Guilford County, North Carolina, combined its health department with that of the County, placed the Health Officer on full-time duty, and set up a county-wide service. In July of the same year, the City of North Yakima, Washington, following a typhoid epidemic, investigated by Surgeon L. L. Lumsden, of the Public Health Service, at his suggestion, employed a city health officer to serve on full time, and arranged for his appointment as county health officer also.

These three county health departments were each organized in an area containing a sizeable city, and in each the needs of the suburban population undoubtedly played a large part in forcing a solution of the problem. In the following year (1912) the first county health department in an area uninfluenced by the proximity of a large city came into being. In that year Robeson County, North Carolina, with a population of 52,500, and without a single incorporated place of more than 2,500 population, appointed a trained physician to act as county health officer and to devote all of his time to the duties of that office. This Robeson County Health Officer should perhaps be counted as the first full-time rural health officer in the United States.

From this beginning the growth of full-time county health organization has been regular, but for the most part slow. By 1920, full-time health services were in operation in 161 counties in seventeen states, and by 1930 in 557 counties in thirty-six states. On January 1, 1932, there were 616 organized counties in thirty-eight states, but during the year the number in operation declined to 581 in thirty-six states. These 581 health departments served 24.4 per cent of the total estimated rural population of the United States. One state, Delaware, maintained in each of its three counties a whole-time health



: COUNTY HEALTH DEPARTMENTS IN THE UNITED STATES BY YEARS 1908 - 1933

organization supported by state funds, which served all of the rural population of the State. Maryland, with 21 of 23 counties organized, with joint state and local support, served more than 95 per cent of the rural population. In all, nine states, Delaware, Maryland, Alabama, Kentucky, South Carolina, Ohio, Arizona, Louisiana and Tennessee, now provide whole-time rural health administration to serve more than 50 per cent of the population.

The rate of growth of the movement as indicated by the number of counties in operation is shown graphically in the accompanying chart. The figures used in this chart for the years prior to 1932 were supplied by Dr. John A. Ferrell from the records of the International Health Division of the Rockefeller Foundation. Those for 1932-1933 are taken from the published summaries of the Public Health Service.

It should be noted at this point that the growth recorded in this chart has not been unaccompanied by a rather high infant mortality. Including the 109 counties in operation in 1920, a total of 739 counties were organized by the end of 1932. Of these, 258 counties, or 34.9 per cent, discontinued, most of them permanently, after a longer or shorter period of operation. The highest mortality occurs in the first year; three-fourths of all counties discontinuing do so before the end of the third year. The years 1923, 1931 and 1932 were those of greatest mortality.

The South Atlantic and the Southern states, with Ohio and Michigan, furnish the large bulk of the total now in operation with the counties in the extreme Northwest, in California, and in the Southwest, supplying most of the remainder. The great belt of Plain states has made as yet, with the exception of Kansas, no marked progress in the movement.

Thanks to the activities of the Committee on Administrative Practice of the American Public Health Association, a comprehensive study of the rural health service was made during the years 1927-1929. From the published report it is possible to obtain a fair idea of the organization, resources and activities of a large proportion of the then existing county health department. The picture contains much of both encouragement and discouragement.

The average county health department serves a population of 32,000 people, and expends for all purposes almost exactly $12,000, or at the rate of 37.8 cents per capita per annum. More than half of existing departments had in 1929 budgets of less than $10,000. Nearly one-fourth had budgets of less than $7,500. Only 60 per cent of the total cost of the service is provided by the local units of government.

The average county department employs less than four persons altogether. One-eighth of the county departments have no nurse; nearly one-half have no sanitary inspector, and more than a third have no clerk. Only slightly more than one-third have more than one nurse, and very few indeed more than two nurses. The average nurse is called on to render service to 19,000 persons. These expenditures and this personnel are, of course, utterly inadequate to meet any but the most obvious and immediate needs of the population served.

The program of service of many of these county health departments reflects these limitations. Immunization and school health supervision receive most attention. Communicable diseases are in general incompletely reported, and in many counties the necessary procedures of investigation and isolation are obviously incomplete and perfunctory. In tuberculosis, some

counties are doing creditable work, but many are able to perform only a very limited amount of service. With the exception of a few Southern states, but little or no work is being done in connection with venereal disease. In the promotion of maternal hygiene, it has been demonstrated in a few counties that cooperation between the health department and private physicians is practical and useful, but many counties have not as yet succeeded in developing these services. The same thing is true in regard to infant hygiene, although most of the counties report at least some activity in this regard. In school hygiene a very large number of medical inspections are made by county health officers, and it would appear that this is regarded by them as a most important form of activity. Some of the Southern states have carried on valuable and creditable activities for the improvement of sanitary conditions in rural areas, and some progress is being made in milk sanitation.

Viewing the picture of county health departments as a whole, it would appear that the amount of service rendered by them in proportion to personnel and expenditures is all that could possibly be expected. The obvious inadequacy of the present service cannot probably be remedied either through increased activity by the present personnel, or through any shifting of emphasis from one to another part of the program as a whole. We cannot expect complete and well balanced programs to be carried on by organizations of the present size. Enlargement and intensification of the program will result only from a very considerable increase in the appropriations available for health work.

Turning from the facts of the present to the prospects of the future, we enter the always hazardous field of prophecy. In this field we can project the lines of present development only a short distance into the unknown future. Even this projection, however, must be based on the proviso that there impends no radical change in the present plan of our general government, in our socio-economic system, or in the organization of our system of medical practice.

With this proviso in mind, we may assume, I think, that the organization of county health departments along present lines will continue until all those counties possessing a population sufficient in size and density to justify the existence of a separate health department have been organized. We may expect, also, that the resources and personnel of these county organizations will in time be increased to the point where they will be able to carry on an adequate program.

In those counties too small in population to require a separate organization, the creation of districts composed of two or more counties, and served by district departments of health, seems highly probable. The way to this development has already been indicated in several states, notably in Michigan.

Necessary to the success of such a county and district organization will be the supply by the state of certain technical and specialized clinical services, in addition to what may reasonably be expected from the health officers, nurses and inspectors of the local health departments. Engineering and epidemiology are already recognized as belonging to this class of service, and the diagnosis of tuberculosis is fast becoming a function of the state, to be rendered through visiting personnel. Prenatal, infant, and child hygiene will probably soon follow the same course. Other services requiring highly specialized training will probably later be added to the program. The creation of a corps of visiting specialists, employed by the state, and rendering technical preventive service in regularly scheduled clinics or consultations, organized by the local health departments, seems an almost inevitable development of the present system.

It is highly probable that in the future a larger and larger share of the support of rural health service will be borne by the state and national governments. It is not impossible that one of the efforts to improve the economic situation of the agricultural population will take the form of relief from taxation, and in such case the support of the primary governmental functions, roads, schools, health and welfare, will be assumed by the state budget, probably with assistance from the Federal government. It is inevitable, of course, that should such a development take place, actual control of the rural health service will become more and more centralized and that the conduct of rural health work may become in fact exclusively a state function.

All of these assumptions as to future development are, as has been said, based on a continuation of our present system of medical practice. Whether or not that system will endure, cannot now be foretold. Should, as is entirely possible, the movement for a better organization of the medical service as a whole finally gain headway, the health service must undergo profound

changes. The substitution of an adequate, organized and continuous medical service for the present inadequate, haphazard and discontinuous system, will remove from the health service a large part of its present burden. The quasi-clinical services which health departments are now attempting to render will automatically be assumed by the medical service. In such case health service may possibly be integrated with the general medical system and made the agency for the organization and conduct of all extramural services. It may conceivably be relieved of all medical functions and revert to the simple sanitary police status of a former day. No one can at present predict with certainty.

In any case, it may safely be assumed that the rural areas of the United States will demand and will receive a volume and variety of medical service, curative and preventive, approximately equal to that rendered in the cities. The clock will not be turned back, whatever the form of the new development.

THE STONE AGE OF SURGERY*

By LOGAN CLENDENING, M.D.,
Kansas City, Missouri

Of course, you gentlemen, members of the Section on Urology, realize that in practicing your specialty you are violating the most sacred oath of the profession. The oath of Hippocrates says:

"I swear by Apollo, the physician, that I will not cut persons laboring under the stone but will leave this to be done by men who are practitioners of this work."

But, like many other oaths and creeds, we realize that the oath of Hippocrates is somewhat outdated. For instance, it says:

"You promise that you will not give to a woman a pessary to produce abortion."

And we know that at the very moment there is being agitated state aborto factoriums, I suppose they would be called, where things can be carried out as they are in Russia.

At least, the inclusion of this sentence in the Hippocratic oath refutes Oliver Wendell Holmes' statement that medicine learned from a friar how to cut for the stone. There were no friars in the days of Hippocrates. The friar to whom Holmes referred was Frére Jacques de Beaulieu, who flourished in the early part of the Eighteenth Century. His dates are 1651-1714.

We know that lithotomy for stone in the bladder, even sometimes for stone in the kidney, was performed long before that because the technic is described by Celsus. Celsus was a great Roman landowner, not a physician in any sense of the word. He became interested in therapy, both human and veterinary, as well as agriculture, simply as a practical matter of caring for his estates and the animals and slaves who lived on them. He lived in the days of Tiberius Cæsar. His description of the technic of lithotomy is as follows:

"A strong and intelligent person being seated on a high stool, lays hold of the patient in a supine posture, with his back towards him, and his hips being placed on his knees, with his legs drawn backwards he orders the patient to seize his own hams with his hands, and to draw them towards his body with all his power, and at the same time he secures them in that position. But if the patient be rather powerful, two able men must sit behind him on two contiguous seats; and their legs next each other must be tied together to prevent their being drawn apart. Then he is placed on the knees of the two in the same manner, and the one, according as he sits, lays hold of the left leg, and the other of his right, and at the same time the patient himself draws up his hams. But whether one or two persons hold him, they are to lean with their breasts over his shoulders. . . . Besides these, two strong persons should be placed, one on each side of the assistants who hold the boy, to prevent either one or both from giving way.

"Then the physician, having carefully pared his nails, introduces his index and middle fingers of the left hand, first the one gently, afterwards the other into the anus, and places the finger of his right hand lightly on the lower part of the abdomen. . . . First of all the stone must be sought for about the neck of the bladder . . . and when it has been brought into that position . . . a lunated incision must be made through the integuments immediately over and extending to the neck of the bladder near the anus, with the horns a little inclined towards the ischia; then a second incision is to be made in the transverse form in the convex part of the wound, so as to open the neck of the bladder. . . . The incision being now made, the calculus comes into view, the color of which is not of any consequence. The stone, if small, may be propelled forward from one part, and taken by the fingers from another; if of considerable dimensions, a crochet made expressly for this purpose, is to be introduced to it and applied to its upper surface. This instrument is thin at the extremity and beat out in the form of a semi-circle; smooth exteriorly, where it comes in contact with the body; rough on the inside where it touches the stone. This crochet should be of moderate length, for when short, it has not the power of extracting the stone. When it has been introduced, and the stone seized it should be inclined to each side, that it may appear certain whether the stone be held fast; if it has been grasped, it moves simultaneously with it. . . .

*Read in Section on Urology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

When it is evident that the stone is safely grasped, a triple motion is employed almost at the same moment; from side to side, and then outwards, yet so that it may be done gently, and the stone drawn a little at first; this being done, the end of the crochet (the handle) is to be elevated, that it may be further within the bladder, and bring out the stone with greater facility. . . ."

While, therefore, we know that the operation was known in very early times, it does not appear to have been performed very often until about the Fifteenth Century. This reluctance is said to have been partly due to the Arabic influence in medicine. It would be difficult to overrate the influence of Avicenna, Averroes, Rhazes and other Arabic and Jewish physicians. Their influence was as great as that of Galen in the Middle Ages and there was an Arabic doctrine that it was unclean to touch the body under certain circumstances. They usually mentioned lithotomy and other surgical operations merely to condemn them.

It was during the Fifteenth and Sixteenth Centuries, after the Arabic influence had waned, that the stone surgeons came into their great vogue. The conditions of practice which they employed throw great light upon the origin of the specialties in medicine. Organized medicine as a profession, as it exists today, is of comparatively recent origin. Most physicians of the Middle Ages and Renaissance were physicians because they were body surgeons to the Duke of This or to the king. They had studied a little anatomy, but most of their clinical opinions were second-hand. Some, such as the Physicians of the Long Robe, had taken a dry, formal course of book instruction and might never have seen a patient before practicing their profession.

Around such a nucleus there was a motley crew of traveling specialists, sometimes not traveling. They were practical men and women who knew some little branch of practice, usually unscrupulous, necessarily blatant advertisers, but, on the whole, of more service to the world than the regular members of the profession. Such, for instance, were the barber surgeons, the phlebotomists, midwives and eye surgeons, one of whom, Sir John Taylor, traveled over Europe in a coach which was decorated with painted eyes. Dentists and herniotomists were others, and, of course, the lithotomists.

There were really two kinds of stone surgeons. One set, thorough quacks, traveled from village to village and claimed to be able to cure mental diseases, epilepsy, and headaches by removing stones from the patient's head. We have many pictures, which will be found in all the great galleries of Europe, of these stone surgeons. They made an incision in the patient's head and having palmed the stone, or stones, allowed them to rattle into a basin, apparently from the incision, to the astonishment and delight of the crowd.

The lithotomists also were usually travelers. We have also many pictures of them. It was a

Fig. 1

Stone doctor, but of the peculiar school which cut stones from the head of the insane. Note the attendant holding the platter for the stones to fall in.

regular thing for a successful lithotomist to have his portrait painted by a famous painter showing the implements of his craft and usually one or two fine calyx stones to impress the onlookers with the horrors of the disease treated.

Most lithotomies were for bladder stone and most of them were by perineal incision. It is true that occasionally a kidney stone was removed, as, for instance, the famous case of a condemned man at Bagnolet in 1474. A stone was removed or supposed to have been removed from his kidney by the members of the faculty of Paris before his execution. In 1633 the English Consul at Venice, Hobson, was so desperate from the torture of a kidney stone that he allowed its removal by a stone cutter named Marchetti. Most of the stones removed, however, were from the bladder.

The greatest improvement in technic was by Marianus Sanctus about 1531, who introduced the grooved director. It was shortly after this time that the great surgeon, Ambroise Paré, was performing lithotomy, and from his glorious book on surgery, translated into English in 1634, I abstract the following description of the operation at that time:

Seeing wee cannot otherwise helpe such men as have stones in their bladders, we must come to the extreme remedy, to wit, cutting. But the patient must first be purged, and if the case require, draw some b'oud; yet must you not immediate'y after this, or the day following hasten to the work, for the patient cannot but be weakened by purging and bleeding. Also it is expedient for some daies before to foment the privities with such things as re'axe and sotfen, that by their yeelding, the stone may the more easily be extracted. Now the cure is thus to be performed: The patient shall be placed upon a firm table or bench with a cloth many times doubled under his buttocks, and a pillow under his loynes & back, so that he may lie halfe upright with his thighs lifted up, and his legs and heels drawn back to his buttocks. Then shall his feet be bound with a ligature of three fingers breadth cast about his ankles, and with the heads thereof being drawn upwards to his neck, and cast about it, and so brought downewards, both his hands shall bee bound to his knees, as the following figure sheweth.

The patient thus bound, it is fit you have foure strong men at hand; that is, two to hold his armes, and other two who may so firmely and straightly hold the knee with one hand, and the foot with the other, that he may neither move his limmes, nor stiree his buttocks, but be forced to keep in the same posture with his whole body. Then the surgeon shall thrust into the urenary passage even to the b'adder, a silver or iron and hollow probe, annoynted with oyle, and opened or slit on the outside, that the point of the knife may enter thereinto, and that it may guide the hand of the workman, and keep the knife from piercing any farther into the bodies lying thereunder. The figure of this probe is here exprest.

He shall gently wrest the probe, being so thrust in, towards the left side, and also he who standeth on the patient's right hand, shall with his left hand gently lift up his cods, that so in the free and open space of the left side of the perineum the surgeon may have the more liberty to make the incision upon the probe which is thrust in and turned that way. But in making this incision, the surgeon must be carefull that he hurt not the seame of the perineum and fundament. For if that seame bee cut, it will not be easily consolidated, for that it is callous and bloudlesse, therefore the urine wou'd continually drop forth this way. But if the wound be made too neare the fundament, there is danger, lest by forcible plucking forth of the stone he may break some of the haemorrhoide veins, whence a bleeding may ensue, which is scarce to be stopped by any means, or that hee may rend the sphincter muscle, or body of the bladder, so that it can never be repaired. Then presently put into the wound some one of these silver instruments de'ineated here below, and called by the name of Guiders.

The wound by the helpe of this instrument being dilated as much as is sufficient, then put in the streight Ducks-bill before described, or the crooked here exprest.

The stone may be sought and taken hold of with these instruments, and being taken hold on, the branches of the instrument shall bee tyed together, lest they should suffer that to slide away which they have once taken hold of. Neither shall the stone be suddenly plucked out, but easily shaken too & again, and at the length gent'y drawn forth.

Oliver Wendell Holmes' friar, Frere Jacques de Beaulieu, had a lurid career. Originally a common laborer, he became a private in a cavalry regiment and then joined a traveling stone cutter and learned the trade from him. For some reason he became a Franciscan monk and, probably for advertising purposes, lived as a hermit and an anchorite. His fame spread all over Europe. He is said to have practiced both suprapubic and perineal lithotomy. His results were not particularly brilliant. One historian says that of 60 patients treated in the spring of 1700, 24 died, 23 were left with urinary fistulae, and 13 were cured.

The stone cutters at this period traveled through the country, often with an extensive organization. Patients were attracted by side shows, rope dancing, clowns and dancing bears. The fee for lithotomy in Germany at this time was 51 marks. One-half the price was returned if the patient died. Uroscopy, or examination of the urine, was 3 cents.

It may be interesting for a moment to view the subject from the standpoint of the patient, and we have an extremely good account of it in the diary of Samuel Pepys. The sufferers from the stone were accustomed to have a little case made to contain their stone, or a visiting card with a representation of the stone upon it and the patient's name. These patients frequently

met together to talk over their operations year after year and persuade others who had not yet formed sufficient resolution to go through the ordeal. Pepys' account is as follows:

"On March 26, 1658, Pepys underwent an operation for the stone. This was performed by Thomas Hollier, or Hollyard, surgeon to St. Thomas's Hospital, who was living in Warwick Lane, and in order to be as near him as possible, the patient took rooms at Mrs. Turner's in Salsibury Court, where the operation took place. The anniversary was afterwards kept as a festival by him, and was celebrated with a dinner to which Mrs. Turner was always invited" (Tanner's biography of Pepys).

Pepys' diary does not begin until January 1, 1659, nine months after his operation. It is one of the great tragedies of literature that Mr. Pepys himself left no account of the actual operation.

In Evelyn's diary June 10, 1669, is the following entry:

"I went this evening to London to carry Mr. Pepys to my brother Richard, now exceedingly afflicted with the stone, who had been successfully cut, and carried the stone, as big as a tennis ball, to show him and encourage his resolution to go thro' the operation."

Pepys' diary March 26, 1659:

"At night Mr. Sheply and W. Howe came and brought some bottles of wine and some things to eat in my cabin, where we were very merry, remembering the day of being cut for the stone. Captain Cuttance came afterwards and sat drinking a bottle of wine till eleven, a kindness he do not usually do the greatest officer in the ship. After that to bed."

"May 1. This day I do count myself to have had full two years of perfect cure for the stone, for which God of heaven be blessed."

"March 26, 1662. Up early. This being, by God's great blessing, the fourth solemn day of my cutting for the stone this day four years, and am by God's mercy in very good health, and like to do well, the Lord's name be praised for it. To the office and Sir G. Carteret's all the morning about business. At noon come my good guests, Madame Turner, The., and Cozen Norton, and a gentleman, one Mr. Lewin of the King's Life Guard; by the same token he told us of one of his fellows killed this morning in a duel. I had a pretty dinner for them, viz., a brace of stewed carps, six roasted chickens, and a jowl of salmon, hot, for the first course; a tanzy and two neats' tongues, and cheese the second; and were very merry all the afternoon, talking and singing and piping upon the flageolette."

"March 25, 1663. At night Mr. Bland came and sat with me at my office till late, and so I home and to bed. This day being washing day and my maid Susan ill, or would be thought so, put my house so out of order that we had no pleasure almost in anything, my wife being troubled thereat for want of a good cook-maid, and moreover I cannot have my dinner as I ought in memory of my being cut for the stone, but I must have it in a day or two hence."

"March 26, 1663. This day is five years since it pleased God to preserve me at my being cut of the stone, of which I bless God I am in all respects well. Only now and then upon taking cold I have some pain, but otherwise in very good health always. But I could not get my feast to be kept today as it used to be, because of my wife's being ill and other disorders by my servant's being out of order. This morning came a new cook-maid at £4 per annum, the first time I ever did give so much, but we hope it will be nothing lost by keeping a good cook."

"March 26, 1664. This being my solemn feast for my cutting of the stone, it being now, blessed be God! this day six years since the time; and I bless God I do in all respects find myself free from that disease or any signs of it, more than that upon the least cold I continue to have pain in making water, by gathering of wind and growing costive, till which be removed I am at no ease, but without that I am very well. One evil more I have, which is that upon the least squeeze almost my cods begin to swell and come to great pain, which is very strange and troublesome to mee, though upon the speedy applying of a poultice it goes down again, and in two days I am well again."

"June 1, 1664. Up, having lain long, going to bed very late after the ending of my accounts. Being up Mr. Hollyard came to me and to my great sorrow, after his great assuring me that I could not possibly have the stone again, he tells me that he do verily fear that I have it again, and has brought me something to dissolve it, which do make me very much troubled, and pray to God to ease me. He gone, I down by water to Woolwich and Deptford to look after the dispatch of the ships, all the way reading Mr. Spencer's Book of Prodigys, which is most ingeniously writ, both for matter and style."

"March 7, 1665. Up, and was pretty well, but going to the office, and I think it was sitting with my back to the fire, it set me in a great rage again, that I could not continue till past noon at the office, but was forced to go home, nor could sit down to dinner, but betook myself to my bed, and being there a while my pain begun to abate and grow less and less. Anon I went to make water, not dreaming of any thing but my testicle that by some accident I might have bruised as I used to do, but in pissing there came from me two stones, I could feel them, and caused my water to be looked into; but without any pain to me in going out, which makes me think that it was not a fit of the stone at all; for my pain was assuaged upon my lying down a great while before I went to make water. Anon I made water again very freely and plentifully. I kept my bed in good ease all the evening, then rose and sat up an hour or two, and then to bed and lay till 8 o'clock."

"August 19, 1664. Creed came to me, and he and I out, among other things, to look out a man to make a case, for to keep my stone, that I was cut of, in, and he to buy Daniel's history, which he did, but I missed of my end. So parted upon Ludgate Hill, and I home and to the office, where busy till supper, and home to supper to a good dish of fritters, which I bespoke, and were done much to my mind. Then to the office a while again, and so home to bed."

"August 20, 1664. Up and to the office a while, but this day the Parliament meeting only to be adjourned to November (which was done, accordingly), we did

not meet, and so I forth to bespeak a case to be made to keep my stone in, which will cost me 25s."

"August 26, 1664. This day my wife tel's me Mr. Pen, Sir William's son, is come back from France, and come to visit her. A most modish person, grown, she says, a fine gent'leman."

"August 27, 1664. Off the 'Change with Mr. Cutler and Sir W. Tider to Cutler's house, and there had a very good dinner, and two or three pretty young ladies of their relations there. Thence to my case-maker for my stone case, and had it to my mind, and cost me 24s., which is a great deale of money, but it is well done and pleases me. So doing some other small errands I home."

MR. PEPYS' REMEDIES FOR THE STONE

"February 12, 1662. Then came an old man from Mr. Povy, to give me some advice about his experience in the stone, which I (am) beho'den to him for, and was well pleased with it, his chief remedy being cast'e soap in a posset."

"January 1, 1663. Doctor of.....dined and his wife, a seeming proud, conceited woman, but the Doctor's discourse did please me very well about the disease of the stone, above all things extolling turpentine, which he told me how it might be taken in pills with great ease."

September 16, 1664. Met Mr. Pargiter and he would needs have me drink a cup of horseradish a'e, which he and a friend of his troubled with the stone had been drinking of."

The diary stops in the year 1669. In 1694, Pepys confessed to being a good deal out of order. In 1702, curiously enough on March 28, he wrote to Sir Godfrey Kneller:

"So it has fallen out that by an unexpected return of an old evil, the stone, I have been under continued incapacity, for these two years and more of stirring out of doors."

He died in 1703 at the age of 70 and at autopsy a nest of seven stones was found in his left kidney.

"These calculi were, I believe, embedded from the beginning in the renal cortex, a rather unusual situation, and it is to this accident of position that Pepys owes his long life and his comparative immunity from symptoms" (Sir D'Arcy Power).

It may seem surprising to some that this operation was so prominent during this period of time. As a matter of fact, surgery then was almost exclusively traumatic surgery or wound surgery. The reason for this is quite plain, that it was impossible to enter a serous cavity of the body without death. Larrey, the surgeon of the Napoleonic armies, did a number of amputations at the hip, but only twice without the death of the patient. Lithotomy was possible because it did not touch any serous membrane.

From all the uncertainty and quackery of the Stone Age of Surgery, the profession was rescued by William Cheselden. Not only did he publish a treatise on "The High Operation for the Stone," but being a surgeon at St. Thomas Hospital he put the entire procedure upon a high plane, making it a part of regular medical practice. His operation, it is true, was violently criticised and for a while he gave it up, but his great contribution was to make lithotomy respectable.

"A TREATISE ON THE HIGH OPERATION FOR THE STONE"* BY WILLIAM CHESELDEN

"In the year 1697, Frere Jacques, as Dionis relates, an ecclesiastick in France, came to Paris to practise his new invented way of cutting for the stone, which was by the direction of a staff into the bladder, near the rectum, but being ignorant of anatomy, he often cut thro' the b'adder, and wounded it in many places, in some he cut off its neck, in others, into the intestinum rectum. Nevertheless, those he cur'd raised him universal reputation. He was sent for to Court, and by the King ordered to cut at both the Hospitals,

*From the preface to show Cheselden's opinion of Friar Jacques.

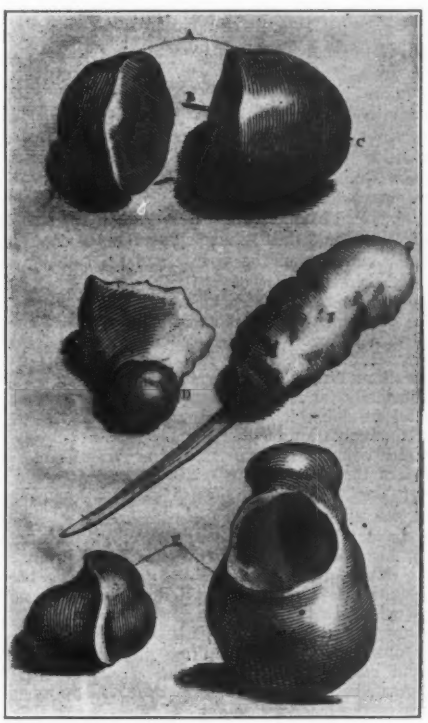


Fig. 2

Illustration from Cheselden's "Treatise on the high operation for the stone" (1723), showing the formation of stone from foreign bodies (mostly used for self-induced abortion purposes).

where the crouds that came to see him were so great that guards were placed to keep them out. But the mischief he did, and the numbers that died, being not to be concealed in these places, he lost his reputation as fast as he had obtained it. Nevertheless, until his patients that died, were dissected, the people (so great was their partiality in his favour) rather believed that the surgeons had poisoned them, than that he could be thus unsuccessful in his operations. . . .

Cheselden's technic of suprapubic lithotomy was thus described by him:

"The patient being placed upon a bed, or quilt laid upon a table, with his head on a pillow, his legs off the table, his thighs raised, and his back a little hollow, so as to relax the abdominal muscles, then we pass a ligature loosely above each knee, and fasten it to the outside of the table, an assistant on each side holding his hands. And having passed the catheter, another assistant grasping the penis gently with his hand, to prevent a reflux of the water; we inject as much warm barly water as will fill the bladder to its utmost natural distention, more being of little or no use to the operation; but very painful, if not dangerous, to the patient. Into a man full grown may be injected near twelve ounces, and into a boy nine years old, about eight ounces; allowance being made for the size of the stone, which being difficult to do exactly, the proper quantity for every patient, may, I think, be more certainly known from the swelling of the abdomen just above the os pubis, if the integuments are thin; by the patient's growing uneasy from the extension of the bladder; and from the resistance which the operator feels to the injection. And that we may better judge with what quantity of water we distend the bladder, the urine should be discharged, before the injection is made. And because an immediate connection of the syringe and the catheter, without the intervention of a flexible tube, would make the catheter too liable to be moved in the bladder, and give great uneasiness; I therefore joyned them together by an oxes ureter which effectually prevented that inconvenience. But before we leave this part of the operation, I must recommend the passing the catheter deliberately, and gently, choosing rather to seem less artful in doing it, than secretly to hurt the patient, for the reputation of doing it quick and dextrously: and indeed I judge this no unnecessary caution in every part of the operation.

"The bladder now being filled, and the catheter drawn out, the assistant must continue to hold the penis until the incision is made into the bladder; I think it may be best held between the fore-fingers, or the fore-finger and thumb, the assistant's hand being placed between the patient's thighs, for in this manner the penis may be so held that neither the skin of the abdomen shall be any way extended, nor the assistant's hand interrupt the operator. The first incision may be made with a round edged knife through the skin, the membrana adiposa, between the musculi recti and pyramidales, even to the bladder near the os pubis, for in that part it may be done safely, the bladder there not lying close to the integuments: this first incision in a man may be about four inches long, one end of it extending almost to the skin of the penis. Then introducing a streight edged knife with the back lying upon the foremost, or middle finger of the left hand to direct it, the incision may be securely finished upwards, and the bladder layed bare from the os pubis, near three inches long. Then passing a crooked knife into the bladder near the urachus, until the point is near the centre of the bladder, so that bringing it out it may cut under the os pubis; and immediately, while the water is flowing out, a finger should be introduced into the bladder, with which the forceps (which may be very thin) will be directed to take hold of the stone, which, if large, should not be extracted hastily, because that encreases the resistance: the wound may be dressed with any digestive medicine, upon which may be layed a soft compress, kept on with an easy bandage. The digestive I used was this, ℞ cerae flav. ℥iv. ol. lini ℥iij tereb. venet tbj. The wounds for some time were fomented at each dressing, which was at first every six hours, except they were asleep, and as long as the urine came through the wounds, the parts about were constantly anointed, to preserve them from being excoriated by the urine, which happened to my first patient."

It is unnecessary for me to detail the improvements that have been made in lithotomy since his time. Only one or two minor points need be mentioned. I show here the title page of a book on "A Remedy for Dissolving Stone." An excerpt from it is as follows:

"GEM'S REMEDY FOR THE STONE"

"This gentleman was relieved by the medicines, but left them off before he was perfectly cured: and dying two years afterwards of a lethargic disorder; upon opening the body, there were found in the bladder two hard, smooth stones, of the size of small chestnuts; each of them containing another within it, so as to rattle upon shaking, like the eagle-stone, or an almond in the shell. The inner stones were so soft as to be easily crumbled between the fingers; and appeared, in the language of the surgeon who took them out, to have been rotted and eaten into. These inward stones or kernels were formed of the calculus, acted upon by the medicines; and the shells arose from a stony substance, formed after the gentleman had omitted to take the medicines. Certainly this difference, in the consistence between the external and internal stones, is a strong presumption in favour of the medicines."

Such books are very common and that hope of humanity's is a very ancient one. But in a double sense, no matter how much people try to dissolve their stones, you gentlemen get them in the end.

The question might arise as to whether stone is as common as it used to be, and if not, why not? Certainly, one can hardly read the literature of the "Stone Age of Surgery" without feeling that it must have been far commoner

then than it is today. Perhaps it is simply because although there is as much of it as ever, urologists are trained to be more reticent and keep professional confidences better than the rest of us.

BIBLIOGRAPHY

Barney, J. Dellinger: Lithiasis. In the History of Urology, prepared under the auspices of the American Urological Association. Vol. 2, chapter 1. Baltimore: The Williams & Wilkins Company, 1933.

Sanford, Henry L.: Historical sketch of the surgical treatment of vesical calculus. Jour. Urol., 2:111, 1924.

Brown, Alfred: Old Masterpieces in Surgery. Privately printed at Omaha, Nebraska, 1928.

Power, D'Arcy: An address on the Medical History of Mr. and Mrs. Samuel Pepys. Lancet, June 1, 1895.

THE LEUKOCYTES IN SKIN DISEASES*

By H. H. HAZEN, M.D.,
Washington, District of Columbia

The following study of the total and differential leukocyte count in 492 patients suffering from skin diseases seems worthy of recording, especially as it shows some marked difference from similar, less complete, work. In all, something over one thousand counts were done. Practically all of these counts were made between the years 1906 and 1912, and they were done upon patients attending the dispensary service of the late Dr. Gilchrist at Johns Hopkins Hospital, or in my own service in the wards and dermatological dispensary of Freedmen's Hospital. Inasmuch as the great majority of patients were from the dispensary it was not possible to investigate thoroughly conditions other than dermatological which might have been responsible for variations in the blood picture.

In every instance a count of 500 cells was made. The stains used were the Ehrlich, Jenner, the Wright, or the Hastings. All these counts were done by me personally, so there can be no question as to a different classification due to a number of different observers.

It is first necessary to be certain of the total of differential counts in normal individuals. The generally accepted counts per cubic millimeter as published are as follows:

*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

ACCEPTED NORMALS

	Total	Polys.	Eosin.	Lymphoc.	Mononucl.	Basoph.
Limits	6000-8000	50-75	0.8-4.0	20-40	6-8	0.4-1.0
Average	7500	70.6	2	23	4.0	0.4

However, in my own work[1] upon the blood picture I have reached slightly different conclusions, namely:

AUTHOR'S NORMALS

	Total	Polys.	Eosin.	Lymphoc.	Mononucl.	Basoph.
Probable limits	6000-8000	50-75	0.8-4.0	20-40	6-8	0.4-1.8
Average	7500	54.6	3.2	34.0	7.4	0.8

The work of some other observers, notably Bunting,[2] is in close accord with my own figures. The classification of leukocytes employed by Ehrlich was used. This is as follows:

(1) Polymorphonuclear neutrophils are the commonest white cells of the blood. The nucleus is polymorphous and stains deeply, while the protoplasm is granular, the granules being small and taking a faint acid stain.

(2) Eosinophils have a nucleus similar to the neutrophils, but the granules are much larger and take an intense acid stain.

(3) Lymphocytes are not over 12 microns in diameter, have a round or slightly indented nucleus and a non-granular protoplasm.

(4) Mononuclears are large, non-granular cells which have a lobulated nucleus.

(5) Mast cells, mastzellen, or basophils are cells whose nucleus does not stain well, but whose granular protoplasm takes on a deep basophilic stain.

(6) Myelocytes are normally cells of the bone marrow and resemble the polymorphonuclear neutrophils or eosinophils, of which they are the parent cells, except that the nucleus is round.

It cannot be too strongly emphasized that personal equation plays a most important part in determining the blood picture. For instance, Engman and Davis[3] record an unusual number of cases in which the large mononuclear cells showed surprising variations in number. It is highly probable that this was due to the technic employed in staining, or to the interpretation of the blood picture rather than to any true changes.

The following table shows the number of cases examined which invariably showed normal

counts and concerning which no comment is necessary:

TABLE 1

Ichthyosis	3
Epidermolysis bullosa	2
Dermatitis venenata	31
Ivy poisoning	7
Intertrigo	4
Sycosis vulgaris	8
Paronychia	5
Erysipelas (mild)	6
Impetigo	12
Impetigo neonatorum	9
Erythema nodosum	7
Acne	28
Seborrheic dermatitis	17
Erysipeloid	14
Lupus vulgaris	9
Erythema induratum	6
Lupus erythematosus	16
Blastomycosis	4
Tinea tonsurans	12
Tinea circinata	13
Tinea barbae	4
Tinea versicolor	5
Pediculosis corporis	5
Rosacea	12
Vitiligo	8
Pityriasis rosea	14
Lichen planus	11
Dermatitis exfoliativa	5
Alopecia areata	9
Xanthoma (non-diabetic)	4
Herpes zoster	6
Pruritis (general)	4

As a result of the work of H. L. Smith, who reported that an eosinophilia was common in scabies, 37 cases of this disease were studied. In one instance a count of 5 per cent was found, but in all other instances the differential count was within normal limits. These figures do not tally with those of Schamberg,[4] who found an average of 7 per cent. Engman and Davis failed to find evidences of eosinophilia in this disease.

Eleven cases of pemphigus were studied with an average of 4 counts to each case. The average leukocyte count was 11,300, but the highest eosinophil count was 6 per cent, while the average count was but 2 per cent. These figures show a marked contrast to those of Schamberg, who reported an average of 12.5 per cent in pemphigus foliaceus, and 15 per cent in ordinary pemphigus. Engman and Davis reported very divergent counts in a few cases, only one case showing a marked eosinophilia.

In dermatitis herpetiformis the results were at wide variance with most of the reported cases. Nineteen cases were studied and in only 2 patients was there an eosinophilia, one of 17 per cent and one of 9 per cent. Engman and Davis report that in half of their cases an eosinophilia was lacking.

In 23 cases of erythema multiforme, 22 patients showed normal, or nearly normal counts, a slight rise in the total leukocyte count being observed in five instances. In one very severe case 5 counts showed an eosinophilia of 9, 20, 37, 18 and 5 per cent, the peak being reached three days after the skin lesions had reached their zenith. In general, reports upon erythema multiforme show nothing striking, although Low[5] does comment that an eosinophilia is not uncommon.

The findings in urticaria were of particular interest. The total leukocyte count was within normal limits and the average eosinophilia was 5 per cent, with limits of 0.5 and 11 per cent. This is in strict accord with the reported observations that allergic diseases are prone to show an eosinophilia. In all, 42 patients were examined, and in 40 of these the basophilic count averaged 1.8 per cent. Bronchial asthma is the one other disease that shows a similar blood picture.

Seventeen cases of allergic dermatitis had counts done and five of these showed a slight eosinophilia, ranging from 5 to 7 per cent. There was no change in the number of basophils.

In 38 cases of psoriasis the total and differential count was normal in 36 patients, but in 2 patients, who showed rapidly spreading acute eruptions, there was a slight eosinophilis of 6 and 9 per cent, respectively.

Five cases of mycosis fungoides were studied, one of which showed an eosinophilia, ranging from 8 to 15 per cent, and one of which showed an increase to 30 per cent in the large mononuclears. Only the first mentioned cases showed a total increase in the leukocyte count, 12,000. Schamberg gives a good review of the blood picture as reported in the early literature.

In no case of skin disease studied was there a total leukocyte count of less than 6,000, and only in the pemphigus cases and one of mycosis fungoides were there any marked increase, although a number of the erythema multiforme patients did show a slight increase. In 53 patients there was an eosinophilia, this being especially marked in urticaria. The eosinophilia is most apt to occur with progressive disease and to decrease as the disease regresses. An increase in large mononuclears was found only in one case of mycosis fungoides. The basophils were

regularly increased in urticaria, but no increase was found in any other disease.

CONCLUSIONS

(1) The normal differential blood picture as given in the text-books needs further study; the percentage of lymphocytes is probably too low.

(2) Most skin diseases fail to show characteristic changes, excepting, of course, leukemia.

(3) The total leukocyte count is increased in the pemphigus group, erythema multiforme, and in some cases of mycosis fungoides.

(4) The lymphocytes show no significant changes in cutaneous diseases.

(5) Eosinophils are regularly increased in urticaria, and frequently in allergic conditions, dermatitis herpetiformis, erythema multiforme, and pemphigus.

(6) Eosinophilia occurs during the progressive stage of disease.

(7) Basophils are markedly increased only in urticaria, just as in asthma.

(8) Skin diseases in which blood changes are often found are: urticaria, allergic dermatitis, dermatitis herpetiformis, erythema multiforme, pemphigus, and mycosis fungoides.

REFERENCES

1. Hazen, H. H.: The Leukocytes in Syphilis. Jour. Cutan. Dis., 31:618, 1918.
2. Bunting, C. H.: The Normal Differential Leukocyte Counts. Amer. Jour. Med. Sci., 152:698, 1911.
3. Engman, M. F.; and Davis, R. H.: Blood Changes in Skin Diseases. Jour. Cutan. Dis., 33:73, 1915.
4. Schamberg, J. F.: Report of Eosinophilia in Scabies. Jour. Cutan. Dis., 30:53, 1913.
5. Low, C.: Anaphylaxis and Sensitizations, p. 21. New York: Wm. Wood & Co., 1925.

DISCUSSION (*Abstract*)

Dr. Raymond Kimbrough, Norfolk, Va.—The fact that most skin diseases fail to show characteristic blood cell changes has to be accepted. The example that Dr. Hazen has set in this laborious study is valuable to dermatology. He has determined that a few dermatoses show fairly characteristic changes.

Evidence has been presented by a number of workers to indicate that the Ehrlich differential count is much less informative and should be replaced by the Schilling classification of leukocytes. The Schilling differential count has proven of definite value in obstetrical practice, pediatrics, certain surgical cases and in tuberculosis. Bredeck has reported that in tubercu'osis it is possible to foretell improvement or retrogression of the process even days or weeks ahead of physical examination, fever, symptoms or x-ray findings. This would possibly apply in lupus vulgaris, but needs verifying.

Students of the Schilling count te'l us that the eosinophil is the most sensitive of all the white cells and is first to disappear in acute infections, and first to return as recovery takes place. In other words, an increase in eosinophils is a favorable finding. This corresponds with the findings in the severe case of erythema multiforme which, Dr. Hazen reported, in that the highest eosinophil count came three days after the skin lesions reached their zenith. A case of this type treated by me recently showed eosinophil counts of 28, 45 and 18. The skin symptoms cleared entirely within five days after the high count was recorded. This indicates that in certain cases blood studies may give valuable assistance toward a more accurate prognosis.

Dr. Howard Fox, New York, N. Y.—The statement is often made that eosinophilia is commonly seen in pruritic skin diseases. This is undoubtedly true of scabies and dermatitis herpetiformis, though eosinophilia is absent in the most itchy skin disease known, namely, pediculosis corporis. While eosinophilia is probably most marked in certain cases of dermatitis herpetiformis it is not a sign of diagnostic value in differentiating this disease from pemphigus or erythema multiforme. All three of these affections usually show not only an eosinophilia but also a leukocytosis. In his series of cases of disseminated lupus erythematosus Mook observed a leukopenia frequently, a sign which I have subsequently found to be rather constant.

Dr. Hazen (closing).—This series of blood counts was done before the modern classifications were known. The fact that eosinophilia is common in urticaria and rare in most other diseases would seem to disprove the suggestion that blood changes in skin diseases are merely accidental, or due to other causes, such as intestinal parasites.

THE PRINCIPAL HAY FEVER PLANTS AND POLLENS OF THE SOUTH*

By HAL M. DAVISON,
A.B., PHAR.B., M.D., F.A.C.P.,
MASON I. LOWANCE, B.S., M.D.,
Atlanta, Georgia,
and
O. C. DURHAM,†
Chicago, Illinois

The area covered by the Southern states reaches from the lower borders of Pennsylvania and New Jersey on the north to the Florida Keys, and from Chesapeake Bay and Cumberland Sound on the east to the western part of Texas, about 1,000 miles north to south and 1,600 miles east to west. It includes seacoast, river valleys, deserts, mountains, forests, and cultivated lands of all kinds. The altitude varies from sea level to 2,000 feet, with mountains rising to 5,000 feet. The mean annual tempera-

*Read in Allergy Clinic and Round Table, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†From the Botanical Laboratories, Abbott Laboratories, North Chicago, Illinois.

ture varies from fifty-five to seventy degrees, and the annual rainfall ranges from ten to sixty inches. Despite these varied conditions, there are certain hay fever plants which, with minor exceptions, are common to almost this whole area.

Originally, studies of the hay fever flora of the South were made some twenty years ago by Dr. Scheppegrell, of New Orleans. During the last ten years, active field surveys and extensive atmospheric studies have been carried on in every Southern state with the exception of West Virginia. The resulting information is at present contained in more than fifty published articles and several books. These have been reviewed, and their authors personally consulted in preparation of this brief resume.

With the help of the United States Weather Bureau and of a number of Southern allergists, one of the authors (O. C. D.) has for the past six years carried on a quantitative study of the pollen content of the air throughout the South. This has involved the examination of more than 8,000 pollen slides.

The present paper is an attempt to give the practical evaluation of the particular pollens of the prominent botanical groups, together with data on their geographical distribution and season of bloom. Under the three general headings, *Trees*, *Grasses*, and *Weeds*, pollens of major prevalence are first listed, followed by a discussion of those plants of local importance only.

TREES

The most important hay fever trees of the South are as follows:

First, the oaks (*Fagaceae: Quercus species*), of numerous varieties, are common throughout the South, except in western Texas. Oak pollen is very abundant during the spring (March to May), constituting on an average about half the early pollen in the air. At Atlanta, if we disregard pine, the oaks furnish 65 per cent of the active pollens found in the air, while at Baltimore the proportion is higher. Even in Missouri, Oklahoma and central Texas, oak pollen is about as abundant as all other tree pollens together. Very little was found, however, on the pollen slides at Coral Gables, Florida.

Beech (*Fagus grandifolia*) is a close relative of the oaks, but is not a profuse pollinator. Its relative importance in allergy has not been determined.

In the extreme Southern states from South Carolina to east Texas, the pines (*Pinaceae*) discharge more pollen than the oaks, and pollinate longer, but seldom cause symptoms. We have found in Atlanta but one patient who was sensitive to pine pollen only. This case responded to specific treatment.

Second in importance are the *Juglandaceae*, including many species of hickory (*Hicoria alba, et species*), pecan (*Hicoria pecan*), and black walnut (*Juglans nigra*), the pollinating season of which is in April and May. These trees are widely distributed throughout the South, except in west Texas. The pecan is especially important in the southern part of Georgia, Alabama, and Mississippi. The pollen of this family constitutes about one-seventh of the active tree pollens found in the air in the vicinity of Atlanta, 0.1 per cent of the tree pollens of Missouri, less at Baltimore, and a much greater proportion in Oklahoma and Texas. No walnut or hickory pollen was found on the slides exposed during the spring of 1930 in Coral Gables, Florida.

Cottonwoods, or poplars (*Salicaceae: Populus deltoides, et species*), pollinate during February, March and April, and are found in most sections of the South. In many places these trees are used ornamentally along streets and roadways, thus making it difficult to avoid close contact with the pollen. The male trees produce abundantly, but the pollen is rather heavy. The amount of cottonwood pollen in the air in various places differs widely from season to season, depending on local weather conditions during the pollinating period.

Next in importance in the order named are:

Box elder or water ash (*Aceraceae: Acer negundo*)
Sycamore (*Platanaceae: Platanus occidentalis*)
Birch (*Betulaceae: Betula species*)
Maple (*Aceraceae: Acer species*)
Willow (*Salicaceae: Salix species*)
Ash (*Oleaceae: Fraxinus americana, et species*)
Elms (*Ulmaceae: Ulmus americana, et species*)

The pollen of any tree or flowering shrub may cause symptoms in isolated cases. One of the authors (H. M. D.) has found cases in Georgia in January and February caused by the pollen of tag alder (*Betulaceae: Alnus rugosa*). Bernton has reported cases in Washington, D. C., due to the pollen of the paper mulberry (*Moraceae: Broussonetia papyrifera*). Waring, of Charleston, South Carolina, also found this pollen in sufficient abundance to cause trouble. Efron, of New Orleans, reports the pollen of privet (*Ligustrum vulgare*) as being a real factor in the production of hay fever in that locality.

Hazelnut (*Betulaceae:* species *Corylus americana*) is of importance in some localities. It pollinates as early as February. Hackberry (*Ulmaceae: Celtis mississippiensis*), Southern hackberry (*Celtis occidentalis*), ironwood or hornbeam (*Capinus caroliniana*), and the Tree of Heaven (*Ailanthus glandulosa*) have been especially mentioned, and appear to be widely distributed.

In Texas, the mountain cedar (*Pinaceae: Juniperus sabinoides*) is especially important. It is found over the State, but is of real importance in the east central part of the State, and is of most importance about Austin. This tree blooms in midwinter, and Dr. Erle Sellers reports that in 1932 it bloomed in the early fall and confused the ragweed season.

The scrub elm (*Ulmaceae: Ulmus crassifolia*) blooms in the fall. It is of considerable importance in east central Texas (Dallas, Austin and San Antonio), and east to Vicksburg, Mississippi. The pollen is very light, and carries very far in a strong wind. Stray granules have been found as far north and east as Cleveland, Ohio. Very little pollen is produced by these trees in a dry season, but in a good season the production rivals ragweed. East of the Mississippi there occurs also the scrub elm (*Ulmus serotina*), but it is of little importance.

In western Texas, mesquite (*Prosopis glandulosa*) occasionally causes allergic symptoms, usually during April or May. Chaparral, a type of scrub oak, and huisache (*Acacia farnesiana*) are also of importance in parts of Texas.

In Florida and possibly along the southern coast in other states, the palms produce sufficient pollen to be considered as possible causes of hay fever and hay asthma, but we have been unable to find reports of any cases caused by this pollen. The date palm (*Phoenix dactylon*), the coconut palm (*Cocos nucifera*) and the cabbage palm (*Sabal* species) are found at Miami.

The groundsel tree (*Compositae: Baccharis halimifolia*) is reported of sufficient abundance about Charleston, South Carolina, and Miami, Florida, to be a possible cause of trouble.

GRASSES

The grasses are of importance in the order named:

(1) Bermuda grass (*Capriola dactylon*)
(2) Johnson grass (*Holcus halepensis*)
(3) June grass (*Poa pratensis*)
(4) Annual blue grass (*Poa annua*)
(5) Orchard grass (*Dactylis glomerata*)
(6) Perennial rye grass (*Lolium perenne*)
(7) Crab grass (*Digitaria sanguinalis*)
(8) Sweet vernal grass (*Anthoxanthum odoratum*)
(9) Timothy grass (*Phleum pratense*)

Bermuda grass is by far the most important grass, since it has spread over nearly all of the South. Timothy is important in the northern part of the Southern states, and occurs in spots over the South, where it has been imported as hay.

In Florida an imported grass, natal grass (*Tricholaena rosea*) is widely distributed, and blooms throughout the year.

In nearly all sections of the South, some grass is in bloom from early spring to late fall, though the bulk of the grass pollen appears on pollen slides during April and May (a month earlier than in the North). In Florida and in the southern parts of Alabama, Mississippi, Louisiana and Texas, grasses pollinate the year around. The pollen of the grasses, especially of Bermuda grass, may be important in any season, and may complicate treatment with any other pollen.

PLANTAINS

The plantains are widely distributed over the South, and occasionally a hay fever patient is found to be sensitive to this pollen alone. The English plantain or buckhorn (*Plantago lanceolata*) is far more important than the common plantain (*Plantago major*). The plantains discharge most of their pollen during the spring.

WEEDS

The families and genera of wide distribution are named in the probable order of their importance over the South in general. Plants of regional and local importance will be discussed later. The ragweeds are more important than all other weeds combined.

(1) *Ambrosiaceae*
  (a) Short or dwarf ragweed (*Ambrosia elatior*)
  (b) High or giant ragweed (*Ambrosia trifida*)
  (c) Marsh elder (*Iva ciliata*)
  (d) Cocklebur (*Xanthium species*)
(2) *Amaranthaceae*
  (a) Spiny amaranth (*Amaranthus spinosus*)
  (b) Red root or rough pigweed (*Amaranthus retroflex*)
  (c) Careless weed (*Amaranthus hybridus*)
(3) *Chenopodiaceae*
  (a) Lamb's quarters (*Chenopodium album*)
  (b) Jerusalem oak (*Chenopodium botyrs*)
  (c) Mexican tea (*Chenopodium ambrosiodes*)
(4) *Polygonaceae*
  (a) Red sorrel, or sheep sorrel (*Rumex acetosella*)
  (b) Yellow dock (*Rumex crispus*)
  (c) Bitter dock (*Rumex obtusifolia*)

(5) *Compositae* (Carduaceae)
(a) Annual sage or wormwood (*Artemisia annua*)

Short ragweed (*Ambrosia elatior*) is common over the entire South, with the exception of the western half of Oklahoma, west of Oklahoma City, and of western Texas, west of Abilene. Pollen surveys show that there is a comparatively small amount of ragweed pollen in the air along the coast from North Carolina to Louisiana. In favorable places in southern Florida, short ragweed pollinates as early as the first part of May. In Tampa it usually begins about the middle of June, and in some sections of Florida continues to bloom until the first part of December (Dr. Frank Metzger).

In and about New Orleans, because of the character of the soil, giant ragweed (*Ambrosia trifida*) is more important than the short ragweed. It is also a large factor in the production of hay fever in Missouri, in the Mississippi Valley, and is important locally throughout the Southern states, except in Florida, where it does not occur.

Pollen from the two above-named species constitutes the bulk of the pollen found in the air during August, September and October. The season is later and longer near the Gulf than in Missouri and Maryland, varying from four to seven weeks. On *Fig. 1* note the high proportion of ragweed in most regions.

Western ragweed (*Ambrosia psilostachya*) may occur anywhere west of the Mississippi River, but is abundant only in western Oklahoma and western and extreme southern Texas. This ragweed comes into bloom as early as May at Brownsville, and continues through September in the Texas Panhandle and in western Oklahoma.

Southern ragweed (*Ambrosia bidentata*) is found in western Kentucky, western Tennessee, northwestern Mississippi, Arkansas, Missouri,

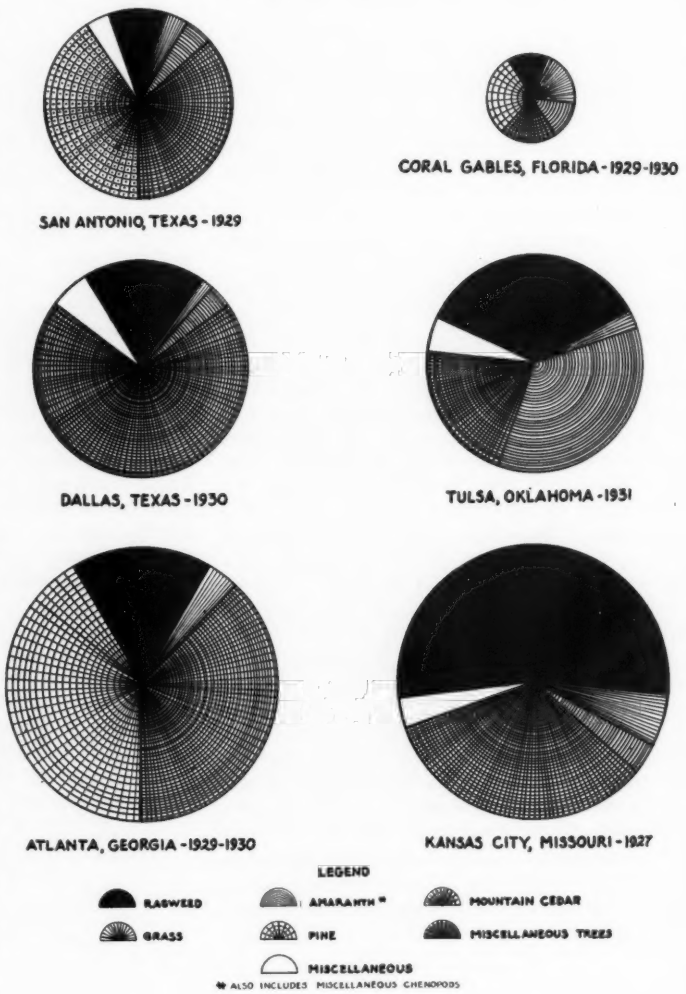


Fig. 1

Comparative Pollen Incidence in Typical Southern Cities.

These graphs show the proportions of various groups of pollen appearing in the air throughout the whole year. The size of the discs represents the comparative total of all pollens found in these places. Note the large amount of mountain cedar pollen at San Antonio, and the large amount of pine pollen at Atlanta and Coral Gables. Most or all of the amaranth pollen at Tulsa, as at Oklahoma City, is from Western water hemp. The studies were made possible by the cooperation of local physicians who exposed the slides: J. H. Black, Hal M. Davison, E. R. Denny, I. S. Kahn, and E. S. Nichol.

eastern Oklahoma, and northeastern Texas. Its relative importance in this area has not been definitely determined. The season of bloom is a short period during late August and early September.

Slender false ragweed (*Franseria tenuifolia*) replaces short ragweed in southwestern Texas, and is not found elsewhere in the South. It produces abundantly.

Marsh elder (*Iva ciliata*) may be of importance in the western part of Georgia, in Tennessee, Kentucky, northwestern Florida, in Alabama, Mississippi, Louisiana, Arkansas, Missouri, Oklahoma, and the eastern half of Texas. The plants grow only in moist soil. The season of bloom is the same as that of the other common ragweeds.

Burweed marsh elder (*Iva xanthifolia*), though widely distributed in the Northwest, is found in the South only in the Panhandle of Oklahoma, in Texas, and the northwest corner of Missouri. Narrow-leaf marsh elder (*Iva angustifolia*) is found chiefly in southern Oklahoma and northeastern Texas. It is a real local factor in hay fever. Another similar marsh elder (*Iva microcephalata*) is found in the pine barrens of South Carolina, Georgia, and northeastern Florida. High-water shrub (*Iva oraria*) is found in the salt-water marshes from Maryland to Texas.

The amaranths are widely distributed, but, except for western water hemp, they are real factors in but few cases. Pigweed is widely distributed, but its pollination is scanty. Spiny amaranth is a fair producer, but never in abundance. Careless weed (*Amaranthus hybridus*) is said to be important in Texas, especially in the western part. Palmer's amaranth (*Amaranthus palmeri*) is found in quantity only in southwestern Texas, where it is fairly important.

Western water hemp (*Acnida tamarascina*) is very important in central Oklahoma and fairly

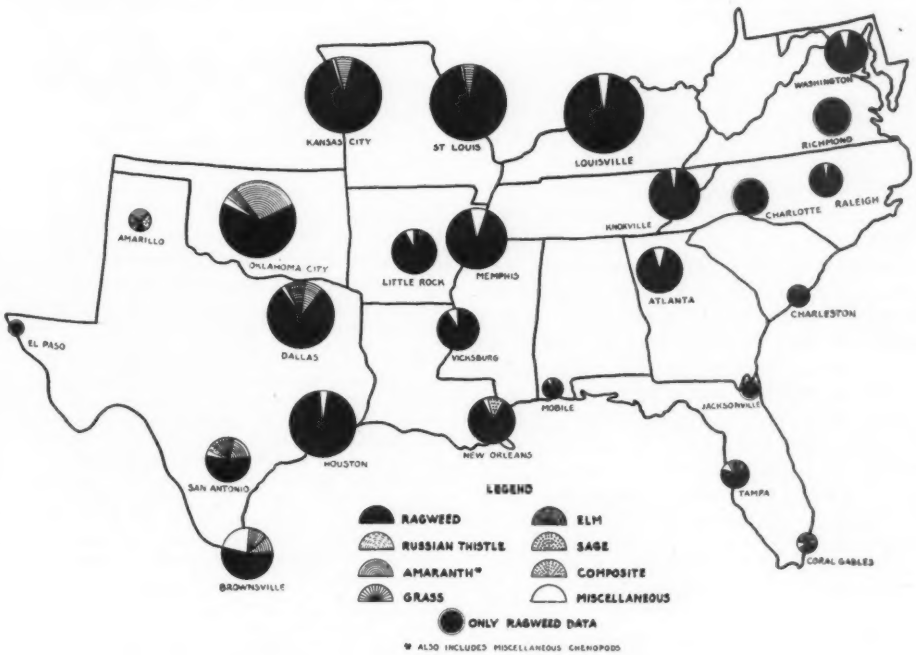


Fig. 2

Distribution of Pollen in the South During the Fall Season.

This map of the Southern states area shows most of the localities in which studies of the pollen content of the air have been made. Most of the data here shown are the result of studies made possible by pollen slides exposed during the past five years by the United States Weather Bureau, and counted by O. C. Durham, of the Abbott Laboratories. The size of the disc in each case represents the proportionate total of all pollens found on the slides. In most instances differential counts were made. In a few, only ragweed was counted. Most or all of the amaranth pollen at Oklahoma City was from Western water hemp. Note the distribution of scrub elm pollen at Dallas, San Antonio, Vicksburg, and Little Rock.

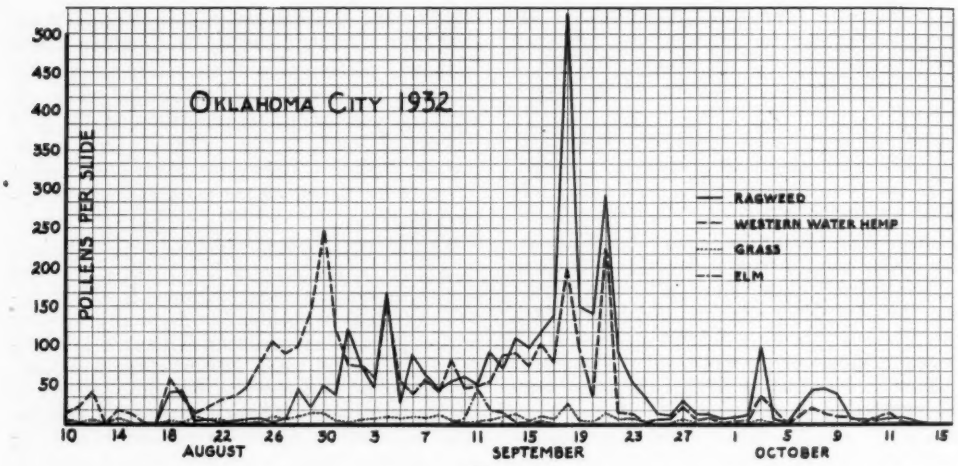


Fig. 3

Atmospheric Pollen Found on Slides Exposed at Oklahoma City During the Fall of 1932.

The figures represent the number of pollens found on 1.8 square centimeters of slide area. Note almost equal amounts of ragweed and Western water hemp pollens and the small but continuous amount of grass pollen. An elm shower lasted for only four days, September 10 to 13. This curve is far different from that found east of the Mississippi River, where, in most cases, ragweed constituted more than 90 per cent of the pollen content of the air.

important in Missouri. It may be considered as a possible factor in western Tennessee, western Mississippi, in Missouri, Arkansas, Louisiana, Oklahoma, and eastern Texas. It pollinates just before and during the ragweed season. Note the large proportion of amaranth pollen at Oklahoma City (almost wholly western water hemp).

The chenopods are of little general importance on account of the small amount of pollen discharged. Russian thistle (*Salsola pestifer*) is of considerable local importance in western Texas, west of Abilene, and western Oklahoma, where it pollinates through August and September.

Members of the dock family (*Polygonaceae*) are widely distributed, but of relatively little importance. They bloom the year around in the vicinity of New Orleans, and in some other areas they bloom in both summer and fall. Red sorrel (*Rumex acetosella*) is by far the heaviest producer of pollen of any member of the family. It pollinates in May and June in Missouri and Maryland.

Of the sages (*Compositae: Artemisia* species), annual sage (*Artemisia annua*) is the most widely distributed Southern species. It is often found in waste areas in the larger cities. It pollinates during September, but the output is small. Prairie sage (*Artemisia ludoviciana*) and related species may be of slight importance in western Oklahoma and Texas. The proportion of sage pollen in the air during the fall at Amarillo is about 5 per cent.

The occurrence of pollen in the air of any community varies largely from year to year, and from day to day, and is influenced by variations in rainfall, in temperature, and in wind. Success in the treatment of pollen hay fever and asthma demands botanical surveys, pollen plate surveys, and seasonal pollen plate studies in order to detect the presence of unusual pollens in the air at any given time.

The authors acknowledge with gratitude the assistance of practically every member of the profession in the South who is interested in allergy with books, reprints, and personal communications. Besides those listed in the bibliography, the following have contributed to this paper: Dr. Harry L. Alexander, Dr. M. T. Davidson, Dr. H. H. Donnally, Mr. Geo. H. Hauser, Dr. N. B. Herman, Dr. J. B. Hibbetts, Jr., Dr. Paul V. Ledbetter, Dr. Flavius D. Mohle, Dr. F. M. Routh, Dr. W. M. Sheppe, Dr. J. B. Stone, Dr. Oscar Swineford, Dr. Narcisse Thiberge, and Dr. L. C. Todd.

BIBLIOGRAPHY

Acquarone, P.; and Gay, L. M.: Jour. Allergy, 2:336, 1931.
Balyeat, R. M.: Jour. Okla. Med. Assn., 19:59, 1926.
Balyeat, R. M.: Philadelphia: F. A. Davis Co., 1930.
Balyeat, R. M.; and Stemen, T. R.: Amer. Jour. Med. Sci., 174:639, 1927.
Bernton, H. S.: Va. Med. Mo., 1:41, 1923. J.A.M.A., 84: 944, 1925. Jour. Lab. & Clin. Med., 13:829, 1928.
Black, J. H.; and Durham, O. C.: Jour. Allergy, 1:501, 1930.
Blanton, W. B.: Va. Med. Mo., 59:140, 1932.
Brown, G. T.: Ann. Int. Med., 1:169, 1927. Jour. Med. Soc. N. J., 29:483, 1932.
Denny, E. R.; and Tenney, G.: Jour. Okla. State Med. Ass'n., 25:293, 1932.

Duke, W. W.: St. Louis: C. V. Mosby Co., 1926.
Duke, W. W.; and Durham, O. C.: J.A.M.A., 82:939, 1924. J.A.M.A., 90:1529, 1928.
Durham, O. C.: Jour. Lab. & Clin. Med., 10:610, 1925. Ibid, 13:967, 1928. Jour. Allergy, 1:12, 1929. J.A.M.A., 94: 1907, 1930. Jour. Allergy, 2:258, 1931. Ibid., 3:357, 1932. Ibid., 4:105, 1933. New Orleans Med. Jour., 85: 492, 1933. J.A.M.A., 100:1846, 1933.
Figley, K. D.: Ohio State Med. Jour., 22:686, 1926.
French, S. W.: Jour. Allergy, 1:286, 1926.
Heinberg, C. J.: Jour. Fla. Med. Ass'n., 17:221, 1930.
Henry, J. P.; and Herring, A. L.: Jour Allergy, 1:163, 1930.
Hoch, J. H.; and Waring, J. I.: Jour. S. C. Med. Ass'n., 29:69, 1933.
Hulsey, S.: Texas State Jour. Med., 28:779, 1933.
Kahn, I. S.: J.A.M.A., 82:871, 1924. Sou. Med. Jour., 19:183, 1926.
Kahn, I. S.; and Grothaus, E. M.: Sou. Med. Jour., 23:662, 1930. Ibid., 24:729, 1931.
Key, S. N.: Texas State Jour. Med., 13:308, 1918.
Metzger, F. C.: Jour. Fla. Med. Ass'n., 19:18, 1932.
Nichol, E. S.; and Durham, O. C.: Sou. Med. Jour., 24:947, 1931.
Patterson, P. M.; and Gay, L. M.: Jour. Allergy, 3:282, 1932.
Penfound, W. T.; Efron, B. G.; and Morrison, J. J.: Jour. Allergy, 1:369, 1930.
Rackemann, F. M.; and Smith, L. B.: Jour. Allergy, 2:364, 1931.
Scheppegrell, William: Philadelphia: Lea & Febiger, 1922. Public Health Reports, 38:1565, 1923. Med. Jour. & Rec., 119: 185, 1924.
Sellers, E. D.: Texas State Jour. Med., 25:297, 1929.
Sellers, E. D.; and Adamson, W. B.: Jour. Allergy, 3:166, 1932.
Vaughan, W. T.: St. Louis, Mo.: C. V. Mosby Co., 1931.
Vaughan, W. T.; Graham, W. R.; and Crockett, R. W.: Va. Med. Mo., 60:158, 1933.
Weil, C. K.: Jour. Med. Ass'n. of Ala., 1:13, 1931.

SWELLING OF THE ORBIT WITH ESPECIAL REFERENCE TO CAVERNOUS SINUS THROMBOSIS*

By CUTHBERT TUNSTALL, M.D.,
Charlottesville, Virginia

Last June two children came under my care both of whom exhibited great orbital swelling. In one, who died of a brain abscess, the initial lesion was a sinusitis. The other, who recovered, had a pimple on the upper lip which had been opened and squeezed. In each instance I feared thrombosis of the cavernous sinus; but this complication did not develop in either case. However, I remember very well three cases with which I came in contact during my internship. Since then I have seen cavernous sinus thrombosis resulting from aural disease. The subject has interested me keenly and I confess that I do not know nearly as much about it as I should like to know. Eagleton's book on the subject is very interesting and it is illuminating in its analysis of the various types of the disease. It does not, however, tell me what I want most to know, that is, how to prevent it. My chief object, therefore, is to provoke discussion which I hope will shed more light upon the subject than I can produce.

The records available to me consist of thirty-five case histories from the University of Virginia Hospital and two from the Martha Jefferson Hospital. These patients were admitted partly on the surgical service and partly on the eye, ear, nose and throat service. In all of them but one, orbital swelling was an outstanding feature. The exception was a patient who was brought in unconscious with otogenic meningitis. He was shown at autopsy to have a thrombus in the posterior part of the cavernous sinus.

Of the thirty-seven cases, fourteen were fatal. Of these, three were of otitic origin. In one, which was summarized above, the thrombosis was secondary to meningitis. One was due to petrositis proved at autopsy. There was pus in the sphenoid; but the pathologist thought the petrositis responsible. The third was secondary to thrombosis of the lateral sinus via the petrosals. The meningitis was a *Streptococcus hemolyticus* infection; the patient with petrositis had a *Staphylococcus albus* blood stream infection, and the lateral sinus in the third case was infected by *Bacillus proteus*. The two of these three patients who had orbital swelling, developed it as a terminal symptom several days after the blood culture was positive. The other had no swelling of the orbit. This bears out Eagleton's observation that when the infection reaches the cavernous sinus from the rear, swelling of the orbit does not occur till the clot has extended far forward enough to block the ophthalmic vein. For this reason the diagnosis can rarely be made early.

Three of the fatal cases were due to sinusitis. One was admitted with meningitis shown at operation to be secondary to necrosis of the roof of a supra-orbital ethmoid cell. The infecting organism was not identified. Autopsy was not permitted and we do not know that the cavernous sinus was involved. The second, one of the children mentioned at the beginning of this paper, had ethmoiditis and antritis. When she was admitted there was very marked chemosis. Free drainage of the orbital abscess apparently improved her condition. The lamina papyracea was not eroded and I believe that the pus reached the orbit from the antrum. It had eroded the superior wall of the orbit and the child died rather suddenly as shown at autopsy of an abscess in the frontal lobe. The blood culture was negative and the cavernous sinus was

*Read in Section on Ophthalmology and Otolaryngology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

not thrombosed. Pus from the orbit grew *Streptococcus hemolyticus* and a chromogenic coccus.

The third fatal case of nasal sinus origin was that of a little girl, a private patient of Dr. Woodward's. She came in with the left frontal, ethmoids and antrum opaque to x-ray. Her left antrum had been washed out in another town two days before. On admission her left orbit showed slight swelling and was painful. She had a septic temperature. The next day an antrostomy was done and the middle turbinate was infracted. On the fourth day, streptococci were reported in the blood stream. There was slight tendency to hemolysis. She received numerous transfusions and supportive treatment. The orbital swelling disappeared entirely, but the temperature remained septic. She ultimately developed meningitis and died on the twenty-seventh day. This was clearly an instance of a chronic compensatory cavernous sinus thrombosis.

One patient died without recovery from shock incident to a fractured skull. At autopsy a piece of wood was found in the frontal lobe surrounded by pus which extended into the cavernous sinus.

One patient was admitted in coma with a peritonsillar abscess, which had been opened, and bilateral exophthalmos. Meningitis, necrosis of the temporal bone, an abscess in the temporal lobe, and pus in the cavernous sinus were demonstrated at autopsy. Culture showed *Staphylococcus aureus*.

One patient came in with a contused wound of the cheek and great swelling. He died the next day. Autopsy was not permitted; but he probably had cavernous sinus thrombosis.

Five of the fatal cases, 36 per cent, had carbuncles: one in the tip of the nose, and four around the mouth. Of these five, four had *Staphylococcus aureus* in the blood stream. The other had a negative blood culture. Various treatments were used: wet dressings, infusions, transfusions and x-ray. The carbuncle in the nose was not incised, but it had probably been squeezed. The others were all incised. None of the methods of treatment did any good. In none of these cases was an autopsy permitted; but they all presented the classical signs of cavernous sinus thrombosis.

Of the twenty-three non-fatal cases, in nine the orbital swelling was due to sinusitis. Some of these patients had a very stormy time. There was one osteomyelitis of the skull and one brain abscess. None of them, however, developed cavernous sinus thrombosis. Dental infection was responsible for three; sarcoma of the orbit, for one; "wild hairs," for one; and an insect bite was blamed for one. Bruises of the upper eyelid, above the eye, and of the lip accounted for three more. Furuncles were the cause of the orbital swelling in five cases; one of the eyelid, one on the forehead, one of the nose and two around the mouth. Of these furuncles, four were incised and the other was squeezed. The same treatments were used as in the fatal cases. The bacteria were also mostly staphylococci. In only one was any radically different treatment used: a little girl referred by a physician when her left eyelids were swollen the day after a furuncle on her upper lip had been opened. The angular vein was ligated immediately as suggested by Bullock,[2] Roeder[3] and Bailey.[4] Wet dressings were also used and it is impossible to say whether the ligation was responsible for the favorable outcome or not. Another patient with a furuncle near the mouth recovered after incision of the furuncle and the application of wet dressings.

CONCLUSIONS

In aural disease, swelling of the orbit is a terminal affair of no value in the treatment of the patient since he is moribund when it occurs.

Sinusitis, while responsible for twelve out of thirty-six instances of swelling of the orbit, did not cause cavernous sinus thrombosis in ten of them. In one case, autopsy was not permitted and the patient died of meningitis before a blood culture was done. There is no evidence that there was cavernous sinus thrombosis in this case.

In the other case there was a cavernous sinus thrombosis of the chronic compensatory type.

In this series there were twelve cases in which cavernous sinus thrombosis was almost certainly present. Of these, three were of otogenic origin; one resulted from sinusitis; one from fracture of the skull with a foreign body in the brain; one from an abscess in the throat; and six, or 50 per cent, from infections of the face.

In eight cases of furuncle or carbuncle around the mouth or on the nose five patients died, presumably of cavernous sinus thrombosis. The

bacteria responsible were essentially the same in the fatal and the non-fatal cases. In all eight cases the lesion was incised or squeezed. What factor determines the outcome is not known.

COMMENT

In only one instance in this series was the angular vein ligated. That patient recovered; but so did another patient with a similar lesion without ligation. It seems to be the consensus of opinion in my neck of the woods that this is probably a good thing to do in suitable cases. The difficulty is that by the time we are sure that our case is suitable it is too late to ligate the vein because the clot has already extended beyond it. I cannot say on the basis of one successful instance that the procedure has any value. It seems to me to be a logical thing to do when the infection is distal to the angular vein. Bailey[4] mentioned in his paper the fact that of five fatal facial infections, four were shown at autopsy to have reached the cavernous sinus via the facial and ophthalmic veins. Early ligation of the angular vein should have saved these patients. It is possible, of course, for the infection to reach the cavernous sinus by way of the pterygoid plexus. It is not unlikely that in two of the fatal cases from facial infection reported here the infection spread by this route since the orbital swelling was not so early and not as pronounced as in the other cases. In these two cases, moreover, the initial lesion was below the line of the mouth and there was pronounced induration of the neck. Still, in the majority of the patients developing cavernous sinus thrombosis from facial infections the early and extreme swelling of the orbit pointed to the conclusion that the infection reached the cavernous sinus at its anterior end, that is, by way of the angular and ophthalmic veins.

I should like very much to hear the experience of you gentlemen with this procedure. Perhaps in the course of the discussion we can compile a large enough series of cases to indicate whether or not it has any value.

In writing this paper I summarized each case history and then summarized the summaries, grouping them according to their etiology. I did this to spare you the tedium of a mass of detail. However, I have here the summaries, and if any of you should be interested in seeing them, I shall be glad to give you an opportunity.

BIBLIOGRAPHY

1. Eagleton, W. P.: Cavernous Sinus Thrombophlebitis. New York: Macmillan, 1926.
2. Bullock, W. O.: Carbuncle of the Upper Lip. Surg., Gyn. & Obst., 14:156-158, Feb., 1912.
3. Roeder, C. A.: Ligation of Angular Vein in Infections of the Upper Lip. J.A.M.A., 90:272-273, Jan. 28, 1928.
4. Bailey, Hamilton: Ligature of the Angular Vein as a Preventive Measure in Facial Carbuncle. Surg., Gyn. & Obst., 46:565-567, 1928.

DISCUSSION (*Abstract*)

Dr. M. M. Cullom, Nashville, Tenn.—I am discussing this paper largely from an academic standpoint. I consider myself fortunate in having very little personal experience in these cases.

I had one well defined case of cavernous sinus thrombosis in a child of seven. However, this case was secondary to lateral sinus thrombosis and resulted fatally after it looked as if the child would recover from the operation on the lateral sinus.

I have had a large number of infections about the nose and upper lip, but luckily none of them eventuated in cavernous sinus thrombosis. Whatever contribution I can make to this discussion will be largely along the line of prevention.

I always warn patients who have infections about the nose and lips not to squeeze them and not to attempt to open them. I try to impress on them the fact that they have a very virulent infection which may easily eventuate in a very grave condition with even a fatal termination. I cleanse the field thoroughly and keep it disinfected with a solution of phenol and formalin, and paint the pimple with tincture of iodine. I wait for the infection to localize and point before incising it. Cleansing and disinfecting the field is for the purpose of preventing auto-infection.

Another point I would like to make is the necessity of correct diagnosis. The condition most frequently confused with cavernous sinus thrombosis is erysipelas. A case of interest that I saw once occurred in a hospital where a member of my family was being treated for a severe burn. A number of other boys were being treated for the same condition in adjoining rooms. A very distinguished ear, nose and throat man had a patient in one of the four rooms that cornered on a cross corridor. He told me that his patient had a cavernous sinus thrombosis as a result of a furuncle in the nose. He had made several deep incisions in it, but got no pus. The next day I saw the patient, a man with a dressing over his right eye. After a look at the eye and his chart I asked the resident surgeon to exclude erysipelas in this case. He was unable to do so. This patient had no special nurse. The same nurse who handled his dressings handled the dressings for all the burned boys. There was every chance for crossed infection. The resident surgeon, the head of the department of surgery, and the surgeon in charge of the case were summoned. All three had seen the case an hour before and had concurred in the diagnosis of cavernous sinus thrombosis. When their attention was called to it they readily agreed that it was a case of erysipelas. That shows how easy it is for the best of men to be misled by an appearance.

I cannot close this discussion without paying tribute to Dr. Tunstall for his thorough investigation of this dreaded and until recently hopeless disease. We are all inclined to shy off from these cases.

I take off my hat to such a man as Mosher, who has made a determined effort to devise a surgical approach to this apparently hopeless condition. All honor to Eagleton, who has made a splendid contribution to its study. I have read the report of a case courageously undertaken by our own Homer Dupuy. If he had lost the case it would have been a magnificent tribute to his gallantry in leading a forlorn hope, but fortune favors the brave and he emerged from the unequal contest with a glorious victory and thereby planted our banner on a new height.

Dr. Homer Dupuy, New Orleans, La.—Up to a few years ago, cavernous sinus thrombosis had a fatal ending in about ninety-nine cases out of a hundred. Recent radical surgery offers new methods of attack. My personal experience records two cures, one already reported in the *Laryngoscope* in December, 1932. Eagleton, a pioneer in this advanced work, reports three cures. Our experience deals with infection of the facial region, furuncles of nose, lips, cheek, edema of eyelids, exophthalmos, and fever. The patient seems, and is, very sick. This clinical picture we now know unquestionably in a large majority of cases to be caused by cavernous sinus trouble. A certain number of patients with similar symptoms may have a purely orbital abscess, caused by ethmoiditis, frontal sinusitis, or from infectious sources. A point of differentiation is that in cavernous involvement the orbital parts are dark blue in color, due to intra-orbital venous stasis. In primary facial infections the external nasal angular vein becomes involved with extension throughout the whole orbital venous channels.

Briefly, our present technic is: ligate the internal carotid artery on the affected side. Why? Because it is anatomically in close proximity to the sinus. Its pulsations must spread infection from the affected sinus through the circular veins to the normal sinus. This is Eagleton's idea. Certainly, once the other previously normal eye is involved, a fatal issue is the outcome.

Our next step is removal of the eye with exenteration of all orbital contents. In our successful cases we found pus at the apex of the orbit. In our non-operated cases, postmortems showed pus in the same deep orbital area. Our last operative step is removal of bone lying in the region of the inferior orbital fissure to gain access to the sinus. We open the sinus, placing strips of gauze for its drainage. This is admittedly radical surgery. Why not? Our efforts these many years have consisted of multiple, blindly conducted, incisions in the orbit and have yielded nothing but failures. Early ligation of the nasal angular vein on the first appearance of exophthalmos is worth consideration. One thing is certain. In such a condition with an almost zero prognosis, there must be no compromise.

Dr. John H. Foster, Houston, Tex.—I feel that all cases of recovery after cavernous sinus thrombosis should be recorded and I have one to add to the list.

This patient had an infection of the throat complicating influenza. Both ears became infected, were opened and discharged. The glands in the right anterior cervical region became enlarged and the overlying tissues indurated. Chills, fevers and sweats developed and the patient became very ill. Although the mastoid was apparently not involved, it was opened and the lateral sinus exposed. There was present a thrombosis of the jugular bulb. The neck was opened and the jugular found thrombosed to the level of the omohyoid muscle. The patient did very well for a few days and then developed the classical signs of cavernous sinus thrombosis. The patient was treated expectantly and improved slowly. A panophthalmitis developed in the right eye and the globe was removed and drainage of the region of the cavernous sinus attempted. The patient rapidly recovered.

Dr. Tunstall (closing).—I am particularly glad that Dr. Dupuy is here to give us the benefit of his experience in actually saving the lives of two patients who had cavernous sinus thrombosis. There are very few who have been so successful. The differential diagnosis is often difficult. It is hard to say that this patient has cavernous sinus thrombosis and this one has not. One of the patients in this series had tremendous orbital swelling, great chemosis and high fever. There was not so much retinal engorgement as one would expect. I felt sure, however, that she had cavernous sinus thrombosis. At autopsy we found that she had thrombi in the ophthalmic veins, but none in the cavernous sinus. She died of a brain abscess. But, in any case, if she had had the operation described by Dr. Dupuy sufficiently early, she might have been saved. Another patient with mastoiditis and petrositis developed cavernous sinus thrombosis with no eye signs until a few hours before he died.

I am sorry that no one discussed his experience with ligation of the angular vein in cases with the original focus on the face. With no testimony to the contrary, I am inclined to agree with Dr. Wellford that in these cases we should probably do well to ligate the angular vein at the first sign of orbital swelling.

Dr. Foster's case of cervical origin was very interesting. I had one somewhat similar which I did not include in this series, since there was no cavernous sinus thrombosis. A young colored woman had a peritonsillar abscess on the left side which was incised. A few days later she was admitted on the medical service with a pain in her chest. Examination showed no pneumonia or pleurisy. She had, however, a positive blood culture. A very keen attending physician asked me to see her with the suggestion that she might have jugular thrombosis. The Tobey-Ayer test gave confirmatory evidence of left jugular occlusion. Exploration showed a clot in the jugular which was excised. The temperature remained septic, however, and the blood culture remained positive. The ear drum was practically normal. We thought that probably there was a retrograde septic thrombus in the sigmoid sinus. It was explored and a very tough clot more than three inches long was pulled out. The mastoid was normal except for a few cells containing pus which all bordered on the sinus. The patient put on no more fireworks and eventually recovered.

A CASE OF NORMAL ASSOCIATED LATERAL AND ALSO DISSOCIATED OCULAR MOVEMENTS*

By J. WARREN WHITE, A.B., M.D., F.A.C.S., Norfolk, Virginia

A full report of this case was sent to Dr. William G. Spiller, of Philadelphia, who wrote me that it was much like a case reported by him in 1927. Dr. Spiller added in his letter to me:

"You may be interested in knowing that a newspaper clipping was sent me from Edinburgh describing the arrest of a pickpocket, who was said by his victims to be cross-eyed. A suspect was arrested, but the man presented no abnormal ocular condition. In the police station a fight was arranged to catch the suspect off his guard. While he was being examined by the police some one in the back of the room got into a loud argument, pistols were fired and the thief, off his guard, threw one eye outward to see what was going on and was detected."

Very little is found in the literature on unilateral innervation of the ocular muscles. Spiller,[1] in the *Archives of Neurology and Psychiatry*, gives a very exhaustive discussion of this condition. He says:

"This condition has been described in various ways, but the entire literature is not extensive. With the exception of the brief reference of Gould's case, all the literature on this subject is in the German language."

The case reported by Spiller had normal associated ocular movements, and in addition the ability to fix with either eye. On command the patient was able to rotate the other eye outward and then bring it back to its original position with its fellow. The case is similar in many respects to the one here reported.

G. H., a young man, aged 20 years, stopped school in the tenth grade because of his inability to concentrate and lack of interest in his studies. Application of his eyes for close work made him drowsy. At the time I saw him he was working in a printing plant with his father. He was a strong, well nourished young man with the complaint that after working for a few days he became tired and had to stop. He gave a history of frequent nose and throat treatments, but no examination had been made of his eyes. From the examination of his eyes it was evident that considerable muscular effort was required to keep the eyes straight and to obtain binocular single vision. This doubtless was the cause of exhaustion after close application to his work. His father was impatient with him and considered his son indolent, worthless and without any ambition.

The patient was referred to Dr. F. H. Redwood for a neurological examination and his report was negative. The refraction of his eyes under a mydriatic showed a plus 1.00 diopter of latent hyperopia. His vision is 20/20 in each eye. Convergence is normal. His adduction is 3 degrees and abduction 2 degrees. Right and left sursumduction are 2 degrees. Exophoria at a distance of 6 meters is 16 degrees.

When looking at an object 6 meters in front of him, both eyes are in the median position and he gets binocular single vision. There is an association of his eye movements in all directions. If either eye is covered, it will deviate outward for the near point or in looking a distance of 6 meters. He has the power to keep the eye deviated out, getting dioplopia, and on command he can voluntarily bring the eye back to the median position and get binocular single vision. In addition he has the power to fix with either eye on an object in front of him, and then to rotate the other eye widely outward and bring it back to its original position on command.

The usual teaching regarding muscular function is that the impulse is always bilateral in case of associated muscles.[2] In this case there is an association and a voluntary dissociation of the lateral ocular movements.

The patient was instructed to assume five positions of the eyes, which he did, while photographs were made of each position.

*Received for publication January 11, 1934.

REFERENCES

1. Spiller, W. G.: Unilateral Innervation of the Ocular Muscles. Arch. Neurol. & Psychi., **18**:691-709, Nov., 1927.
2. Fuch: Text-Book of Ophthalmology. Philadelphia: J. B. Lippincott Co., 1917.

Fig. 1 The patient is looking directly forward.

Fig. 2 Associated movements to the left.

Fig. 3 Associated movements to the right.

Fig. 4 Voluntary movement of the right eye to the right and left in the median line.

Fig. 5 Voluntary movement of the left eye to the left and right eye in the median line.

REPEATED NEONATAL DEATHS FROM IMPETIGO NEONATORUM*

By M. Pierce Rucker, M.D.,
Richmond, Virginia

Mrs. C. W. is 27 years old. This is her fourth pregnancy. Her confinement is expected December 17, 1933. Her last menses began May 12. She is greatly worried on account of her experiences at her former deliveries. Her first baby was a nine-pound girl, born in 1929. The labor lasted 48 hours, but was otherwise uncomplicated. Her second baby was a boy, also nine pounds in weight. He was born in 1931. The mother had an easier time. The baby had sores at the roots of the nails, would not eat, had convulsions, and died in twelve days. The third baby, also a nine-pound boy, was born August 24, 1932. The delivery was a normal uncomplicated one. This baby also had sores about the nails when he was born. He died in ten days. All of the deliveries were in the country (50 miles from Richmond) and the weights of the babies were estimated. It is certain, however, that they were large, well-formed babies. Dr. Richard Fowlkes saw both boys and made the diagnosis of impetigo neonatorum. He saw the second boy the day after he was born, and is convinced that the skin lesions antedated the birth of the baby.

I saw the patient first in February of this year. Her family history is negative except that a paternal aunt has diabetes. The patient has had no serious illnesses nor surgical operations. She is 5 feet 4½ inches tall and weighs 182¼ pounds. Physical examination is entirely negative. In spite of the fact that Dr. Fowlkes found the husband's and the patient's blood Wassermann negative, her family physician has been giving her a mercury and iodine compound. Her blood Wassermann was again negative at my examination. Pelvic examination shows an intact perineum. The vaginal and vulval mucosa is pink and free from visible discharge. The fundus is firm, anteflexed and moderate in size. No masses nor tenderness are made out on either side. I saw the patient again after she became pregnant, and again her examination was entirely negative except of course for the pregnancy. She has been watched carefully during her pregnancy by Dr. Head, her family physician, and so far it has been entirely normal. She wants a boy, but in view of her past experiences with boys, she is almost afraid to hope that she will have one. If any of you gentlemen can throw any light upon this case, my patient and I will be very grateful.*

*Case Report, Section Clinic, Joint Session, Section on Obstetrics and Section on Gynecology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*The patient was delivered on December 8 at the Retreat for the Sick, of a boy which weighed 9 pounds, 6½ ounces and measured 20¾ inches. The baby was anointed with ammoniated mercury ointment as Dr. H. J. Stander suggested, and no water or oil was allowed. There has been no sign of impetigo.

INTRALIGAMENTOUS PREGNANCY AT TERM*

REPORT OF TWO CASES

By H. H. Ware, Jr., M.D.,
Richmond, Virginia

Case 1.—L. I., a colored woman, aged twenty-five years, married, gravida three, para two, was admitted to St. Philip Hospital June 21, 1932. Her last menstrual period began September 4, 1931, and she was at term June 11, 1932. The patient stated that she was referred by her private physician because of difficult labor and the passing of blood clots from her vagina.

She complained of considerable lower abdominal discomfort since the beginning of pregnancy, and said she had a little bloody discharge from her vagina almost constantly during the fifth, sixth and seventh months of pregnancy. She said that labor pains commenced definitely at 4:00 a. m. June 17, 1932, almost four days before admission to the hospital. About twenty-four hours before admission she was given morphine sulphate one-fourth of a grain by hypodermic and quinine sulphate fifteen grains orally. This was followed by pains which occurred at five- to ten-minute intervals, and she passed several clots of blood from the vagina. No fetal movements had been felt for about seven days prior to hospitalization.

Her past history was essentially negative. Menses commenced at the age of eleven years, occurred regularly every twenty-eight days, duration six days, with slight pain the first day. She was married in 1925, and her first pregnancy was in 1929. It was terminated at home with forceps after twelve hours of labor. The baby was stillborn. The second pregnancy was in 1930, and it terminated at the eighth month spontaneously, after a labor of fourteen hours. The baby weighed three pounds, but it is alive and well. The convalescence from both labors was normal.

Her husband was alive and in good health.

*Case Reports, Section Clinic, Joint Session, Section on Obstetrics and Section on Gynecology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*From the Obstetrical Department, Medical College of Virginia.

Physical examination showed a temperature of 98.6°, pulse 95, respiration 22, blood pressure 135/80. Heart and lungs were normal. The examination was otherwise negative except the abdominal and pelvic findings. The abdomen was ovoid and protruded more than was normal. The fetal small parts were palpated above the level of the umbilicus. A mass the size of a large orange and of varying consistency was palpated just above the symphysis to the right of the midline and below the umbilicus. Regular contractions occurred in this mass at approximately five-minute intervals and were accompanied by abdominal pain. No fetal heart sounds were heard.

Vaginal examination revealed the cervix large, soft, eroded and lacerated a little, but not effaced. A finger could not be introduced through the internal os, but several small pieces of loose tissue were removed from the cervical canal and sent to the laboratory for study. The cervix was definitely continuous with the small mass palpated abdominally on the right side.

Laboratory Report.—There were 4,200,000 erythrocytes and 80 per cent hemoglobin. The Wassermann reaction was negative. A catheterized specimen of urine showed specific gravity 1.010, a trace of albumin and a rare pus cell. It was otherwise normal.

A diagnosis of extra-uterine pregnancy was made. A roentgen ray examination by Dr. D. D. Talley revealed findings which he stated were compatible with an extra-uterine pregnancy.

The patient was delivered by abdominal operation under spinal anesthesia at 1:30 p. m. June 21, 1932. When the abdomen was opened, the uterus was found to be the size of a large orange; it was rotated to the right side of the pelvis and anterior. The left broad ligament was enormously distended and contained the pregnancy. We were unable to identify clearly the left fallopian tube and ovary. They had apparently become adherent to the left broad ligament. The right tube and ovary were normal.

The posterior surface of the left ligament was opened and a macerated fetus was removed. A portion of the placenta and membranes were removed with little difficulty and only slight oozing. About one-third of the placenta was densely adherent in the base of the intraligamentous cavity and it was left *in situ*. The upper three-fourths of the abdominal incision was closed. A portion of the edges of the broad ligament were removed, the remaining edges were sutured in the lower angle of the abdominal incision and the cavity in the broad ligament packed with gauze.

The fetus was macerated. It weighed five pounds and twelve ounces. The umbilical cord was 12 cm. long and approximately 3.5 cm. in its greatest diameter. At its umbilical attachment it contained a hernia filled with coils of small intestine.

The patient was returned to the ward in good condition. She was given pantopon as necessary for the relief of pain. Five hundred c. c. of normal saline solution was given intravenously immediately after the operation. Glucose solution 10 per cent intravenously and normal saline by hypodermoclysis were given several times during the first four days after operation.

The packing was gradually removed and was entirely out seven days after operation. Small pieces of placental tissue were removed with the packing. The sinus continued to drain a little for six weeks, but closed with good support.

She voided spontaneously after operation and had very little abdominal distention. Her temperature was 104° F. at one reading the day after operation, but gradually lowered to 99.6° on the third day postoperative. It fluctuated from normal to 101 and a fraction for four weeks postoperative.

Dr. Lewis C. Pusch, of the Pathological Department, examined the tissues from the patient and reported the tissue removed from the cervical canal before operation as necrotic decidual tissue. His report of the excised edges of the broad ligament was as fol'ows:

"A portion of the wall of a cavity, 15 cm. in greatest diameter, with a maximum thickness of 1 cm. A portion of the fallopian tube is incorporated in one portion of the wall, and this with its mesosalpinx twisted upon itself in a 'U' shape forms a separate compartment with a greatest diameter of 9¼ cm. Its inner lining is smooth, pink and glistening. The inner lining of the larger cavity is rough, trabeculated, lobulated and covered in places with soft brownish material. The lumen of the fallopian tube communicates by an orifice 1½ cm. in diameter at its fimbriated extremity with the larger cavity."

"Pathological Diagnosis.—Old broad ligament pregnancy arising from tubal pregnancy with tubal abortion. Chronic pseudofollicular salpingitis."

The rabbit ovulation test for pregnancy was run on two specimens of urine from this patient, one collected the day of operation and another collected on the seventh day postoperative. Both were positive. Unfortunately no further specimens were tested. However, in another patient with an abdominal pregnancy, operated upon by the author, the placenta was left *in situ* and the abdomen closed without drainage. This patient was followed by Dr. Rolland J. Main and positive ovulation tests were obtained as long as thirty-one days after removal of the fetus.

Case 2.—P. W., a colored female, aged 34 years, gravida one, para none, was admitted to St. Philip Hospital September 21, 1932. She was referred to the hospital by her private physician because of pregnancy of eleven months' duration and probably a dead fetus. Her last menstrual period commenced October 17, 1931, and she was probably at term July 24, 1932.

The patient stated that her pregnancy was uneventful until the fourth month, at which time she had severe nausea and vomited frequently until the beginning of the fifth month. During the fourth month she was given twelve ampules of corpus luteum intramuscularly and remained in bed most of the time.

Fetal movements were first noticed by the patient early in March and last noticed August 18. During July, which was probably the ninth calendar month of pregnancy, nausea and vomiting reappeared, but it was controlled by intravenous injection of glucose solution. During the same month she had considerable edema, but it disappeared in August, soon after the fetal movements were last noticed.

Her physician was unable to hear any fetal heart sounds after August 18, and the induction of labor was attempted three times in September before this patient was admitted to the hospital. Castor oil and quinine were used once and vaginal packing twice. She had a few intermittent abdominal pains and a little vaginal bleeding each time.

Menstrual periods commenced at the age of fifteen years and occurred regularly every twenty-eight days, duration three to four days with no pain. The patient denied any former pregnancies and the past history was otherwise negative.

Physical examination showed a well nourished colored woman with an abdomen enlarged to the size of an eight months pregnancy. The abdominal mass was symmetrical and extended 29 cm. above the symphysis. We were unable to outline the fetus or to hear fetal heart sounds. No uterine contractions could be palpated.

Her heart and lungs were normal, but she appeared to be slightly toxic. The temperature was 99°, pulse 88, and blood pressure 134/88.

A catheterized specimen of urine was normal. Blood examination showed erythrocytes 4,250,000 and hemoglobin 85 per cent. The Wassermann reaction was strongly positive. A specimen of urine collected September 24, two days before delivery, gave a negative rabbit ovulation test.

Roentgen ray examination showed a fetal skeleton outline with the head presenting as a left occipito-posterior. Overlapping of the cranial bones was noted.

Vaginal examination showed a recent laceration on the right side of the cervix which looked as if an instrument had pulled out a piece of tissue the size of a dime. The cervix was soft, small, closed, and seemed to be continuous with the mass palpated abdominally. A small piece of gauze was introduced into the cervical canal and the vagina packed with gauze.

Twenty-four hours later no pains had been noticed and the packing was removed. There was no dilatation of the cervix.

Five days after her admission to the hospital it was decided that the pregnancy was abnormal and could not be delivered from below. A laparotomy was done under spinal anesthesia. The pregnancy was found completely confined in the right broad ligament. The uterus was posterior, and on the left side of the lower abdomen almost completely out of the pelvis, and flattened out by the pressure from the fetus. The left tube and ovary were apparently normal. Omentum was adherent to the right broad ligament, the right tube was flattened and adherent to the omentum and peritoneal covering of the right broad ligament.

The right broad ligament was opened and a badly macerated fetus which weighed five pounds and eight ounces was removed. The membranes and most of the placenta were separated and removed with ease. There was very little loss of blood. The intraligamentous cavity was packed with gauze, the split edges of the broad ligament sutured into the lower angle of the abdominal incision for extraperitoneal drainage, and the upper portion of the abdominal incision closed.

The patient was returned to the ward in good condition. Except on the ninth day, when her temperature was 103.6°, it remained below 101° during the first eleven days postoperative. Thereafter it was normal. All of the gauze packing was removed by the sixth day, and she was discharged from the hospital, the incision healed, and in good condition twenty-one days after delivery.

These cases had had no history suggestive of tubal rupture or abortion, and one of them had practically no discomfort until late in pregnancy.

In one patient the diagnosis of extra-uterine pregnancy was easily made and in the other only at operation.

Rhythmical uterine contractions with an extra-uterine pregnancy were observed in one case. The cervical canal remained closed in both patients.

Both patients voided spontaneously after operation and had practically no abdominal distention.

In *Case 1* the fetus had been dead probably five weeks before the mother was examined by us and a specimen of her urine gave a negative rabbit ovulation test.

Case 2 was delivered probably four days after fetal death occurred and a specimen of urine collected seven days later gave a positive rabbit ovulation test.

DISCUSSION (*Abstract*)

Dr. Edward Speidel, Louisville, Ky.—It is difficult at times to make a positive diagnosis of abdominal pregnancy. In a uterine pregnancy the abdominal wall and the uterine tissues may be so thin that the extremities of the baby can readily be grasped through the tissues. The differentiation can then be made by x-ray if in the supposed abdominal pregnancy the uterus is first injected with lipiodol. A triangular dark shadow outlining the cavity of the empty uterus with the abdominal pregnancy should settle the diagnosis.

The conduct of the placental stage in the delivery of these abdominal pregnancies has been considerably simplified of late. The cord is simply ligated close to the placenta, the membranes are trimmed closely and the abdomen closed without disturbing the placenta proper. Peritoneal absorption takes place rapidly and if any portion remains and causes symptoms, it can be safely removed later on by a second operation, as the blood supply in the placental mass will be obliterated and there need be no fear of hemorrhage in its removal.

Dr. Ware (closing).—The second patient stated that she felt no fetal movements for four weeks prior to the time she was examined by us, and from the appearance of the fetus at the time of operation it had probably been dead five or six weeks. In this case the presence of a dead fetus caused no disagreeable symptoms in the mother, not even an elevation of her temperature.

The number of days after delivery that the urine would have given a positive rabbit ovulation or Friedman test is problematical. However, in a case of abdominal pregnancy reported by us in the *American Journal of Obstetrics* we obtained a positive ovulation test on a specimen of urine collected thirty-one days after the baby was delivered. The placenta was left *in situ* in this patient and the abdominal incision healed by primary union.

SATISFACTORY TREATMENT OF SOME FORMS OF RESISTANT TINEA INFECTION*

By H. R. COGBURN, M.D.,
Mobile, Alabama

Discussing the treatment of tinea capitis, Dr. George C. Andrews, in his new "Dermatology," begins with the following sentence: "Temporary improvement frequently follows strong antiparasitic remedies, but such relief is seldom permanent and cures from them are therefore infrequent."

This is the case in the East, but there seems to be some merit in these local applications in some other sections of the country, Dr. Andrews says, and he explains this situation on the assumption that there are different strains of fungi in the different sections, and therefore a difference in the virulence of the organism in the various sections of the nation.

Sutton, in his latest edition, remarks:

"Inasmuch as local antiseptics cannot reach the bottom of the follicle as long as the hairs are in place, it is essential that the hairs in the diseased areas be removed, and this is best accomplished by means of the x-ray."

Stelwagon, in 1915, recommended this treatment, as did Sabouraud. A leading dermatologist in New York City said he would not undertake the treatment of tinea capitis without the use of x-ray. In the large clinics in the East, this method of treatment is routine. The majority of the leading men in Europe make the claim that without x-ray there is little or no hope of a permanent cure of this trouble.

It is freely admitted by dermatologists everywhere that tinea capitis is very resistant to treatment, that the dermatologist must have the full cooperation of the patient, and that the treatment must be persistently and religiously adhered to over a rather long period if we are to get a permanent cure.

In south Alabama there is not a single case on record to my knowledge in which tinea capitis has been treated with x-ray by a dermatologist. A few cases have drifted into the hands of a technician in an x-ray laboratory and have received x-ray treatment or treatments on the scalp for tinea infection. These men, however, rarely know what dosage (in skin units) they have given and rarely know what the ultimate outcome has been in any given case.

We have seen a few patients who came to us after having had x-ray treatment in a laboratory of this kind. Some of them have shown total destruction of the hair follicles, and of course permanent baldness, with (in some cases) considerable atrophy and telangiectasia.

We have found beta naphthol and sulphur in saponis mollis for a shampoo and beta naphthol and sulphur in vaseline thoroughly massaged over the affected areas daily, to be a very efficacious and entirely satisfactory treatment of tinea capitis.

Our technic is simple. In the office we remove all hairs that readily pull out. We then clip the hair very short around each diseased area, wash the area clean and dry the skin thoroughly. With a glass applicator we apply tricresol around the margin of each lesion. As soon as the skin is blanched we neutralize the tricresol with alcohol. The patients are then given two prescriptions with detailed instructions as to daily use: 12 per cent precipitated sulphur, beta naphthol 6 per cent in saponis mollis. The patient is instructed to wet the hair with warm water and rub on the shampoo till the scalp is lathered heavily. The lather is allowed to remain on the entire scalp for one hour, with the head bound up. It is then washed out, the hair dried and the lesions are thoroughly massaged with 12 per cent precipitated sulphur and 6 per cent beta naphthol in vaseline. This salve is allowed to remain on the scalp for 24 hours, when another shampoo is given, and it is followed immediately with the salve well rubbed in. This is routine treatment each day and the mother is directed to pull out all loose hairs at each treatment. The patient returns to the office every seven to ten days for the applications of tricresol.

This simple procedure has been routine in our office for many years, and in all these years it has served us well. In no single instance has it failed us in a case of tinea capitis.

I would not deny the value of x-ray in tinea capitis. I do not make the statement that we should not use x-ray on the scalp for ringworm infection, but to this time it has not been necessary or desirable. Our cases clear up entirely in about three months. We do not claim anything new or original in this method of treatment. It is as old as dermatology. Our claim is that this safe and conservative method has

*Read in Section on Dermatology and Syphilolgy, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

been entirely satisfactory in our hands over a long period of years, and it is believed when it is used painstakingly and persistently it will serve the purpose well, and that the great majority of cases will clear up without resort to the more drastic measures now so much in vogue.

EPIDERMOPHYTOSIS

The dermatologist sees many cases of this trouble after much treatment by physician and layman. There seems to be great confusion in the minds of physicians and patients regarding it, much of which is perhaps due to the multiplicity of misleading names it bears, and the many nostrums that are extensively advertised to the laity for its cure regardless of the stage in which the disease is found. Ours is a port city and bathing places abound on every hand. These bathing places, as we all know, are fruitful sources of this trouble. Patients come in complaining of athlete's foot, Chinese rot, water poison, tetter worm, ground itch, eczema, blood poisoning, and so on, according to the stage of the disease they are in, many times as a result of previous efforts at treatment.

We all, of course, find some cases of severe dermatitis venenata produced by very strong, irritating remedies, or we find a neglected case with secondary pus infection that is causing constitutional symptoms from absorption of toxins.

The treatment, of course, necessarily depends on the condition when first seen.

If we get the untreated case, and get it early, we use Whitfield ointment (2-4-32) spread on a piece of cloth cut to fit the affected area, applied snugly over the affected skin, covered with wax paper or cellophane, and kept in place with a bandage or adhesive plaster. This dressing is allowed to remain on for 24 hours. It is then removed and replaced with a new one. This is done once daily for three days. The patient then comes to the office and the affected areas are denuded with a sharp skin curette and a pair of curved scissors. The lesion is washed off with alcohol and one skin unit of unfiltered x-ray is given. The patient is then given a salve of salicylic acid pulvis 6 per cent, precipitated sulphur 12 per cent in vaseline and directed to rub it on the affected areas twice daily and keep them covered lightly with gauze. An effort is made to keep soap and water off of the diseased area. It is cleansed with carbolized oil or alcohol once daily. If there is any recurrence the skin is again removed with Whitfield ointment spread on cloth and applied daily. X-ray is again given (one skin unit unfiltered) on the twenty-first or twenty-eighth day, and is followed by the use of the salicylic-sulphur salve. The great majority of cases respond satisfactorily to this treatment. Badly irritated cases are soothed with calamine emulsion. When the irritation has sufficiently subsided, if there are deep-seated lesions, we use Whitfield ointment spread on cloth and bound on. This is followed by x-ray and then the salicylic-sulphur salve is rubbed on. If there are no deep lesions we get good results with the salicylic-sulphur salve and no x-ray. Some cases respond best for us when a modified Whitfield containing sulphur and thymol is thoroughly massaged into the skin and the affected parts are not bandaged.

Acute conditions with secondary pus infection respond well to the following routine: the vesicles and pustules are trimmed off carefully with sharp curved scissors and the affected area is washed clean with soap and water, then dried. Pledgets of sterile gauze are placed between the fingers or toes, gauze pads are placed so as to cover thoroughly all the diseased area, and the part is bound up. The dressing is kept constantly saturated with Thiersch's solution. Remove the dressing once a day and open all pustules, trim off all loose skin and redress. Infected cases handled in this way clear up in a few days and leave a clear dry area that will be pretty well denuded and ready for x-ray or any other treatment that may be indicated.

It is worthy of note that Thiersch's solution is a fairly good keratolytic and its constant use does not irritate the surrounding normal skin. It is a satisfactory application to use on any weeping surface with or without pus.

Old chronic cases of parasitic eczema (so-called) respond well if Whitfield ointment (2-4-32 to 4-4-32) is spread on cloth and applied for three or four days to denude the area thoroughly. One skin unit of unfiltered (and in some cases filtered) x-ray is then given, and this is followed with zinc-tar paste spread thick on cloth and bound snugly to the affected area. This paste is removed once daily, the area being cleansed with carbolized oil and the paste renewed. It is x-rayed again in twenty-one to twenty-eight days. The tar paste is applied continuously and the use of soap and water is avoided.

Excessive perspiration causing the feet to be soggy practically nullifies any treatment in some

of these cases. It is believed that the free use in the day time of a dusting powder of powdered boric acid containing one-half dram of powdered salicylic acid to each ounce is very beneficial, making the skin dry and firmer and much more responsive to treatment.

At night the feet should be cleansed with alcohol and a suitable ointment should be well massaged into the skin. This, together with an occasional x-ray, will usually clear up this type of trouble in a relatively short time.

The method of application of Whitfield ointment has a great deal to do with the results obtained with it.

When real denudation is desired, Whitfield ointment spread thick on cloth and snugly applied will produce results which the same prescription rubbed on the skin would not give. After the latter treatment the condition may lag over a long period, requiring more x-ray and other treatment than is necessary when Whitfield is properly applied.

Suite 406 Merchants National Bank Bldg.

A CASE OF UNILATERAL CLUBBING OF THE FINGERS*

By GROESBECK WALSH, M.D.,
and
R. H. ALLDREDGE, M.D.,
Fairfield, Alabama

N. P., a negro, 50 years of age, was first admitted to the Employees' Hospital with a luetic tumor of the right testicle on February 20, 1924, and dismissed on March 11, 1924.

The patient was readmitted on November 13, 1933, and discharged November 19, with a diagnosis of aneurysm of the aorta, involving in all probability the right innominate artery. Laboratory findings in general at that time were negative. He had a moderate hypertension of 170/115. A brief notation of the findings regarding the aneurysm is as follows: "A pulsating, expansile mass the size of a walnut in the right side of the neck just above the sterno-clavicular junction, and beneath the attachment of the sterno-cleido-mastoid muscle." Over this mass a bruit, characteristic of an aneurysm, was easily heard with a stethoscope. Several fluoroscopic examinations of his chest confirmed the diagnosis: aneurysm of the arch, involving some of the greater vessels on the right side.

He was again admitted on December 9, 1933, and discharged January 29, 1934. A more detailed examination on that occasion showed the characteristic changes associated with unilateral clubbing of the fingers. Strange to say, the auscultatory findings characteristic of aneurysm over the pulsating mass had largely disappeared. On this occasion the patient had developed intra-abdominal symptoms, his admission being due to a massive gastric hemorrhage some hours before admission. Barium meal December 18, 1933, showed 50 per cent six-hour retention and marked filling defect in the pyloric end of the stomach. Posterior gastro-enterostomy was performed January 12, 1934, when an extensive carcinoma of the stomach was discovered. A complete nervous review, including deep reflexes, cutaneous pain sense, and so on, taken on the two arms for the purpose of comparing one with the other, was negative in every way.

This unilateral clubbing of the fingers is an extremely rare condition. A recent dissertation on the subject by Loucaides,[1] of Vienna, revealed that he was able to discover only seventeen cases previously reported in the literature, including one of his own. All of these cases, with one exception, followed the occurrence of aneurysm, involving to a greater or lesser extent the aorta and the great vessels in the shoulder girdle on one side. One case was associated with an old subluxation of the shoulder joint.

Loucaides[1] states that the first case of unilateral clubbing was described by Ogle,[2] in 1859, in "The Transactions of the Pathological Society of London." Osler has described two cases of unilateral clubbing of the fingers.

Barney Brooks,[3] in a contribution to the "Surgical Clinics of North America," described a case following an aneurysm in the right axillary artery. He quotes an instance described by Sir Thomas Smith, in which the clubbing of the fingers became less marked after the aneurysm had been operated upon.

*Received for publication March 24, 1934.
*Reported before the Jefferson County (Alabama) Medical Society, March 19, 1934.
*From the Medical Section of Employees' Hospital, Fairfield, Alabama.

REFERENCES

1. Loucaides, L.: Unilateral Clubbed Fingers. Zeitschrift fur Klinische Medizin, **121**:724, 1932.
2. Ogle, J.: Enormous Aneurysms of Right Subclavian Artery. Transactions Pathological Society of London, **10**:103, 1859.
3. Brooks, Barney: Aneurysm of the Axillary Artery. Surgical Clinics of North America, August, 1930.

SYMPOSIUM ON MALARIA—Part 2‡

RESULTS OF RECENT RESEARCH IN THE TREATMENT OF MALARIA*

By CHARLES F. CRAIG, M.D.,†
New Orleans, Louisiana

During the year ending November 15, 1933, most of the research relating to the treatment of malaria has been confined to the study of the effect of the new drug, atabrine, in the treatment of this infection. In addition, a considerable amount of new work has been done upon the effect of plasmochin and its combination with quinine, known as chinoplasmin.

Atabrine.—This drug was evolved by Mietzsch and Maus and was first called erion, or plasmochin E. It is the dihydrochloride of alkylamino-alkylamino-acridin and is a yellow powder with a bitter taste, soluble to 7 per cent in water at 40° C. In 1932 Kikuth found, as a result of tests made on birds, that it destroyed the schizonts of *Plasmodium praecox,* but did not kill the gametocytes, although it seemed to have an inhibiting effect upon them. In 1933, Schulemann showed that when this drug was combined with plasmochin the gametocytes did not appear and relapses did not occur. In human malaria Sioli, Peter and Mullens (1932) showed that it destroyed all forms of the benign tertian and quartan parasites and also the schizonts of malignant tertian, but that the crescents were not affected. Green (1932) successfully infected Anopheles mosquitoes of several species with *Plasmodium falciparum* by feeding them on patients at the end of a seven-day course of treatment with atabrine, thus proving that the gametocytes were not influenced by the drug.

A considerably small amount of work has been recorded regarding the use of atabrine upon a large scale in the treatment of malarial infections. The following facts appear to be demonstrated regarding the drug.

(1) *Toxic Action.*—It is apparent that the toxicity of atabrine is negligible beyond the occurrence of gastro-intestinal irritation and the coloration of the skin to be mentioned. Green (1932) treated fifty patients with atabrine and three of these complained of severe pain in the abdomen, appearing about the fifth day of treatment and lasting for a week. The occurrence of abdominal pain has also been noted by other reporters, but these symptoms are apparently of no serious import beyond the discomfort which is present. The only definite report of severe toxic action by this drug is that by DeMello and his co-workers, who found fatty degeneration of the liver and kidneys in rabbits and cats poisoned with large doses of the drug. So far as I have been able to ascertain from the literature, no such lesions have been noted in man.

The yellow staining of the skin mentioned above is sometimes accompanied by similar staining of the conjunctiva and appears occasionally in patients under treatment. However, this cannot be considered a toxic reaction, being due entirely to the staining properties of the drug. According to Green (1932), the yellow staining apparently occurs in those cases where the excretion of the drug is so long delayed that none appears in the urine before the fourth day after commencement of the treatment. Sioli (1932) reports that the yellow stain may last for two or three weeks after cessation of treatment.

(2) *Dose.*—The dose of atabrine recommended is 0.1 gram (1½ grains) three times a day. Green (1932) found that 0.2 gram a day was too little and 0.4 gram too much and considered that the optimum daily dose is about 0.1 gram per 18 kilograms of body weight. Some of the United Fruit Company's officers have found it convenient to administer the full daily dose of 0.3 gram in a single dose instead of dividing it into three doses and state that it is just as effective given in this manner and is not accompanied by unpleasant symptoms.

The usual course of treatment recommended is 0.1 gram three times a day for five or six successive days, while children should take 0.005 to 0.1 gram once to three times daily according to age.

In the treatment of infection with *Plasmodium falciparum* it is recommended that the usual dosage of atabrine be accompanied by plasmochin, 0.01 gram (1/6 grain), three times daily in

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†Colonel, Medical Corps, U. S. Army, Retired; Professor of Tropical Medicine, Tulane University of Louisiana.

‡EDITOR'S NOTE.—The Symposium on Malaria, papers and discussions from the National Malaria Committee, meeting conjointly with the Southern Medical Association at Richmond, Virginia, November 14-17, 1933, which are to be published in the SOUTHERN MEDICAL JOURNAL, will appear in three parts: Part 1 in May, Part 2 in this issue, and Part 3 in July.

adults and 0.005 to 0.01 gram (1/12 to 1/6 grain) one to three times daily in children according to age. Some authorities prefer to give atabrine three times daily for seven days, as they have observed a much smaller number of relapses after the seven-day course of treatment.

(3) *Persistence of the Drug in the Body.*—Green (1932) found that atabrine could be demonstrated in the urine for eight or nine days after cessation of a seven-day course. Neumann and LeDoux (1933) found atabrine present in the urine thirty-six days after the last dose and Jarvis (1933) found that it persisted for an average period of twenty-six days after a seven-day course of treatment and in one instance as long as thirty-seven days. This persistence of the drug in the body in all probability accounts very largely for its efficacy in the prevention of relapses.

The simplest method for demonstrating atabrine in the urine is that of Green (1932), who recommends the addition of sulphuric acid to the urine followed by heating. If atabrine is present a cloudy yellow color develops which is best seen by looking down the test-tube from above.

(4) *Atabrine and Relapses.*—Probably the most valuable property of atabrine is its apparent success in the prevention of relapses in malaria. Green (1932) in twenty-one cases noted no relapses, while there were thirteen relapses among thirty-four individuals treated with quinine. James and his co-workers (1932), in a five-day treatment of fifteen cases, noted a relapse in only one case, four of the permanent cures being in people who had suffered with chronic relapses of the infection and had taken several courses of quinine, while in five cases of infection with the pernicious "Rome" strain of *Plasmodium falciparum,* no relapses occurred after a five-day course of atabrine. Similar results have been noted by numerous authorities. In my own personal experience of ten cases treated with this drug, a relapse was noted in only one case after a five-day treatment. Of the ten cases, three were infected with *Plasmodium falciparum* and seven with *Plasmodium vivax.*

A valuable contribution to this subject has just appeared in the annual report of the Malaria Advisory Board of the Federated Malay States for the year 1932 by A. Neave Kingsbury. He states that one hundred and twenty cases have been treated with atabrine at the Institution for Medical Research and have been compared with control cases treated at the same time with quinine. He states that the action of atabrine in the treatment of benign tertian and quartan malaria compares very favorably with quinine both as regards the time of disappearance of parasites from the blood and the disappearance of the symptoms. In infections with *Plasmodium falciparum,* however, particularly in heavily infected cases, atabrine seemed somewhat inferior to quinine. He states that atabrine is definitely superior to quinine in preventing relapses. As an example he instances a series of twenty-six benign tertian cases treated over thirty days with seven grains of quinine daily and kept under observation for a period of three months. Of this series 55 per cent relapsed. In thirty-two benign tertian cases treated for seven days with atabrine and observed on an average over longer periods, one, or about 3 per cent, relapsed. He reports that atabrine has no advantage over quinine in rendering subtertian malaria non-infective to mosquitoes.

As regards toxic symptoms one patient treated with 0.4 gram daily developed a definite yellowish color of the skin, taking fifteen days to disappear. Five others showed a faint yellow tinging of the skin. A small percentage of cases complained of epigastric pain usually occurring after the course had finished, while a few cases complained of supra-orbital headache after taking the treatment. All of these patients were taking more than the recommended dose of the drug, which is 0.1 gram three times daily.

The report also deals with the use of atabrine on rubber estates. On one estate the parasite rate for the atabrine treated group fell from 33 per cent before to 7 per cent five weeks after the course had been completed. On the same estate the control group of individuals that had received the usual quinine treatment showed an increase of the parasite rate from 17 to 26 per cent. On another estate the parasite rate among the atabrine-treated group decreased from 29 to 12 per cent, while the parasite rate rose from 15 to 28 per cent in the quinine-treated group.

Kingsbury believes that the disadvantages of atabrine treatment are the possible occurrence of a yellow discoloration of the skin; toxic symptoms, as abdominal pain; and its lesser efficacy in destroying the ring forms of *Plasmodium falciparum* as compared with quinine. He believes that on the whole in the treatment of this infection atabrine gave somewhat inferior results as compared with quinine. The advantages of atabrine treatment he believes to be

the short period of treatment necessary to cure most infections; its superiority in preventing relapses; the possibility of its use in the treatment of black water fever and in those who have an idiosyncrasy to quinine; and the fact that it is less unpleasant to take than quinine.

In summing up the data that is at present available regarding this new drug, one would appear to be justified in stating that it is by far the most efficient drug known in the treatment of malaria so far as the prevention of relapses is concerned. There have been no reports of dangerous toxic symptoms and the usual period of treatment of five days with 0.1 gram three times daily appears to be sufficient in practically every case of tertian and quartan malaria to effect a cure. This is certainly a great advance over any other method of treatment that we possess and would indicate a greater use of the drug and a careful study of its effects in large numbers of cases. Unfortunately at the present time the cost is great, but it is doubtful if it is more expensive to treat a case of malaria with atabrine than with quinine when one considers the long period of treatment necessary with the latter drug. If one can cure the average case of malaria in five days, it is certainly a marked advance over the thirty to forty day treatment with quinine that must be used in order to effect a cure in most cases of malarial infection.

Plasmochin.—This drug, which was developed by Schulemann and his co-workers, has been extensively used both in the prophylaxis and treatment of malarial infections. In the malaria of birds it proved more efficient than quinine and for this reason was recommended in the treatment of the latter infections. Early in the history of this remedy it was found that it was capable of destroying all forms of the tertian and quartan plasmodia, but was not so effective in destroying the schizonts of *Plasmodium falciparum,* although it markedly affected the gametocytes of this species, causing their destruction when administered in very small amounts. Continued observations regarding the effect of this drug in the treatment of malaria have corroborated those first published in that it appears to be quite efficient in curing tertian and quartan infections, but much less effective in curing estivo-autumnal infections.

Toxic Action.—When the drug was first used it was recommended by Schulemann and Memmi that it be given in a dose of 0.06 grams daily. However, it was found that with this dose toxic symptoms frequently occurred and many of those who used it were forced to discontinue treatment owing to the appearance of such symptoms. The symptoms often occurred very suddenly, consisting of marked cyanosis of the face, severe abdominal pain, a rise in temperature with the development of hemoglobinuria and jaundice, followed by death in some cases. In these cases the liver showed marked hepatitis and fatty degeneration or necrosis. These toxic symptoms led very promptly to the reduction of the dose of the drug which will now be discussed.

Dose.—The dose recommended by Schulemann and Memmi, 0.06 grams daily, was so frequently followed by severe toxic symptoms and, more rarely, by death, that it was quickly abandoned and a dose of 0.04 grams daily was recommended in its place. Even with this dose toxic symptoms were not infrequent and even death occurred in rare instances.

Following this dosage of the drug and the consequent failure to prevent toxic symptoms, the dose was reduced to 0.03 grams per day, but even with doses as small as this Fischer and Weise (1928) found methemoglobinuria in 10 out of 13 patients. However, it appears that this dose is practically safe, provided it is not given for more than a week without intermission. Macphail (1931), in Guatemala, treated several thousands of people with this dose of the drug combined with 20 grains of quinine over a period of six days and observed toxic symptoms in only one case.

The dose used in the standard treatment of malaria by the United Fruit Company consists of 0.02 grams of plasmochin combined with 24 grains of quinine daily for six days and this method and dosage is reported as giving good results so far as the reduction of malaria upon the Company's plantations is concerned.

Plasmochin in Prophylaxis.—In the prophylaxis of malaria a daily dose of between 0.01 and 0.02 grams has been found effective in rendering the gametocyte carriers non-infective to mosquitoes and doses as small as 0.01 gram administered twice a week were found by Barber (1932) to be effective, but the infection rate of mosquitoes rose rapidly fourteen days after stopping the drug. In a valuable contribution by Kingsbury and Amies (1932) they found that the sickness rate from malaria was reduced by 50 per cent and no gametocyte carriers were

present among 330 laborers on a rubber estate treated for a period of twelve months by doses of 0.04 grams of plasmochin twice weekly. Clark (1933), as a result of the use of the drug in the prophylaxis of malaria in Panama, concludes that in view of the high cost of the drug and the administration cost of plasmochin under field conditions, its use in prophylaxis does not seem to be justified by the results obtained.

The use of this drug in prophylaxis, like that of quinine, depends upon the efficiency of the methods of employment. Unless very strict control can be exercised, the results with this drug are probably no better than with quinine prophylaxis and the impossibility of exercising strict control is well known to all workers in the field. It would appear probable that the addition of plasmochin in small doses to the treatment with quinine of acute cases of malaria will result in a diminution in the amount of malaria in any locality and the indications are that the addition of plasmochin in doses of 0.01 gram three times daily for a period of two or three days at the end of the treatment of acute cases of malaria should be practiced when possible, in combination with quinine, as there is no question that the drug, even in this dosage, does so affect the gametocytes as to prevent mosquito infection.

Plasmochin in the Treatment of Malaria.—All of the available evidence to date would appear to demonstrate that plasmochin should not be used for the cure of malaria, but only for its destructive action upon the gametocytes. While it is efficient in curing tertian and quartan malaria and the relapse rate appears to be slightly smaller than after the use of quinine, it is believed that the benefits obtained are insufficient for it to replace the latter drug in the treatment of this infection. However, as stated above, it would appear to be indicated in the treatment of all individuals who show gametocytes in their blood and should be combined with quinine in all malarial infections after the symptoms have subsided in order to kill the gametocytes which may have developed.

So far as the evidence goes, the combination of plasmochin with atabrine, as already mentioned, would appear to be the preferable method of treating estivo-autumnal malaria and perhaps preventing infection of the mosquito.

OBSERVATIONS ON WINTER INFECTION RATES IN *A. MACULIPENNIS* AND *A. SUPERPICTUS* IN BULGARIA*

By K. Drensky, M.D.,
and
R. K. Collins, M.D.,
New York, New York

Although the importance of *A. maculipennis* and *A. superpictus* as vectors of malaria has been well established in the Petritch area, no attempt has been made to ascertain whether either of these species, which, in this area pass the winter in hibernation, were carriers of the parasite during hibernation.

The point is of added interest because of the possibility that if hibernating mosquitoes do harbor viable parasites throughout the winter, they may add to the possibility of the occurrence of actual new infections during the early spring months. The question of the occurrence of new infections in the early spring epidemic rise has always been a controversial one largely because of the lack of accurate information with regard to the factor which forms the subject of this study. It is common knowledge among private practitioners in the Petritch area and among students of malaria as well that cases of winter-born babies which present an acute attack of malaria in April and May are not at all uncommon in this area. Similarly many instances have been reported of individuals who have apparently never before suffered an acute attack of malaria, who acquired acute symptoms in the early spring months. Of course in the latter case, the possibility of latent infections acquired during the previous fall cannot be excluded.

The studies of Mayne in America show that infected Anopheles may be found from May to October, that is, during the malaria season, but that they are not to be found from October to May. In such a case the possibility of acquiring new infections from hibernating mosquitoes would appear to be excluded. Muhlens and Doflein in Europe also report their inability to

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*The studies and observations on which this paper is based were conducted with the support and under the auspices of the International Health Division of the Rockefeller Foundation in cooperation with the Inspectorate of Malaria of the Bulgarian National Department of Public Health.

find infected hibernating Anopheles. Jansco mentions that at temperatures lower than 16° C. the sporogenous cycle in mosquitoes is arrested.

On the other hand, Sella in Italy and Swellengrebel in Holland show that infected anophelines are to be found among hibernating mosquitoes, especially those resting in houses, and they believe that these are able to infect throughout the winter. Wenyon also reports that in Macedonia he found oocysts in hibernating anophelines throughout the winter. King, in America, and Iams, in Europe, have shown experimentally that the occurrence of low temperatures causes a retardation in the development of the parasite in the mosquito, but does not kill it, and that with the return of suitably high temperatures development proceeds anew. These latter authors also show that without question sporozoites of *P. vivax* are able to live through the entire winter in hibernating mosquitoes.

With the hope that additional light might be thrown upon the question of the possibility of new infections being acquired in the early spring months, a series of dissections of *A. maculipennis* and *A. superpictus* was undertaken between February 7 and April 20, 1933.

The mosquitoes examined, *A. maculipennis* and *A. superpictus,* were caught exclusively in barns. During the winter months in this area no mosquitoes are to be found in the houses or living quarters. This may be due to the varying temperature of the living quarters which ordinarily are warmed through the day by a small iron stove and allowed to cool off during the night. The damp, constant warmth of the barns appears to be preferable to the hibernating mosquitoes of this area which are found readily in such places.

The mosquitoes were caught in special celluloid tubes and transferred to lantern jars. They were kept in an unheated cellar room of the laboratory until examination, which, in the case of specimens containing no undigested blood, occurred on the same day of the catch. Specimens with blood remaining in the stomach were preserved for dissection until the stomach was empty.

Dissection of glands was done by expression while stomachs were removed in the routine manner. All positive material was preserved. The stomachs were kept whole and the sporozoites were fixed on slides and stained with Giemsa.

The results of the dissections made show that:

(a) During February, 208 *A. maculipennis* were examined, of which 4, or 1.9 per cent, exhibited sporozoites. During the same month there were examined 59 *A. superpictus,* none of which showed any sign of infection.

(b) During March, 307 *A. maculipennis* were examined, of which 6, or 1.9 per cent, showed sporozoites. Of 107 *A. superpictus* examined, 1, or 0.9 per cent, showed oocysts.

(c) In April, 94 *A. maculipennis* were dissected, of which 1, or 1.0 per cent, showed sporozoites, and one, or 1.0 per cent, showed oocysts. Of 39 *A. superpictus* dissected during this month 1, or 2.5 per cent, showed oocysts.

(d) The totals for the entire period are thus: 609 *A. maculipennis* dissected, of which 11, or 1.8 per cent, were infected, and 208 *A. superpictus,* of which 2, or 0.9 per cent, were infected.

It is also to be observed that the infected specimens of *A. maculipennis* were almost exclusively with sporozoites, while in the infected *A. superpictus* only oocysts were found.

This is the exact reverse of the condition observed at the end of the previous summer, when *A. maculipennis* showed a far larger proportion of positives with oocysts only, while *A. superpictus* positives were only with sporozoites.

In this connection the relationship of the occurrence of *P. falciparum,* together with a high sporozoite rate in *A. superpictus* in late summer and fall and of *P. vivax* with a high sporozoite rate in *A. maculipennis* in the early spring months, is both interesting and suggestive.

A striking detail of the sporozoite infected *A. maculipennis* was the abundance of parasites to be found in almost every instance. The numbers of parasites were so great that it often seemed that more than the stomach alone must have been involved in their production. Often no further trace of the cyst wall could be seen, but the field would contain enormous numbers of sporozoites. Although the ovaries and organs of the reproductive system were carefully examined, no parasites could ever be found within them.

For the most part the oocysts observed during these dissections were of moderate size and ordinary appearance and could not be distinguished from the oocysts seen during the summer. No denegeration was apparent nor was there any obvious reason why the cysts should

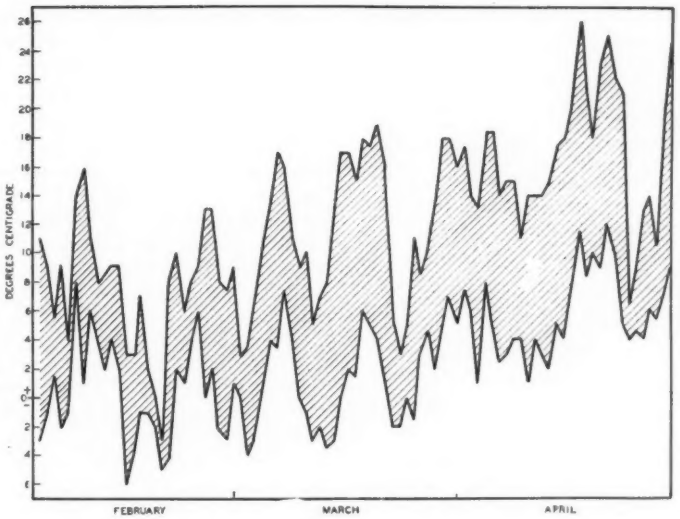


Chart 1

not have proceeded to normal development under propitious conditions of temperature.

Chart 1 gives the outdoor temperatures during the period when the dissections were made. It is to be noted that the temperature was quite low for a prolonged period, in fact much lower than that at which, presumably, the sporogenous cycle in the mosquito is arrested. Despite these low temperatures in February, March and April, infected mosquitoes were found with normal appearing oocytes and sporozoites. It must be recalled, however, that these mosquitoes were not caught out of doors, but in barns and stables where, because of the presence of animals and the fermentation of manure, the temperature was sensibly higher than outside. Unfortunately we have no record as to the actual temperatures within the barns where the mosquitoes were caught.

Having found infected mosquitoes during the winter months, it was interesting to know whether or not mosquitoes would bite man during the hibernating period or in the very early spring. By means of precipitin tests made on the stomach contents of mosquitoes caught during the late winter and summer months a comparison could be made. It was found that during March and April the percentage of all blooded insects examined which contained fresh human blood was sensibly higher than at other periods of the year. This was particularly true of *A. maculipennis*. *Table 1* gives a summary of the results of these precipitin tests.

Table 1

PRECIPITIN TESTS

Months	Species	Total No. Examined	Homophile No.	Homophile Per Cent
3d and 4th	A. maculipennis	90	30	33
6th to 10th	A. maculipennis	109	23	21
8th to 10th	A. superpictus	121	17	14

Resuming the facts thus far presented, we find that:

(1) The sporozoite rate among *A. maculipennis* is higher during the months of February, March and April than during the summer months, while that of *A. superpictus* is lower.

(2) The *A. maculipennis* bite man even during the hibernating period as indicated by the results of precipitin tests.

CONCLUSION

From the above facts we may conclude that there is indeed a real possibility that new infections may occur as the result of the bite of infected hibernating anophelines and that this factor may not be unimportant in explaining the spring epidemic rise of malaria which is so characteristic of the disease in the area of the study.

STATISTICS OF MALARIA PREVALENCE*

REPORT OF SUB-COMMITTEE ON STATISTICS FOR THE PURPOSE OF ENCOURAGING THE IMPROVEMENT AND STANDARDIZATION OF METHODS FOR THE REPORTING AND TABULATION OF STATISTICS OF MALARIA PREVALENCE AND ENCOURAGING THE COLLECTION AND TABULATION OF DATA RELATING TO THE ECONOMICS OF MALARIA

By STEWART G. THOMPSON, D.P.H.,†
Jacksonville, Florida,
J. GEORGE DEMPSEY, M.D.,
New Orleans, Louisiana,
and
BUTLER TOOMBS,
Atlanta, Georgia

Your Committee this year has confined its efforts to work on the basic information shown on the medical certificate of death where "Malaria" is given as the cause of death. Through questionnaires and other contacts, it has been found that considerable carelessness has been in vogue in that the simple statement of "Malaria" is often shown when there is actually a doubt as to the death's having been caused primarily by malaria. In order to safeguard this classification as well as to prepare basic material for future tabulations, your Committee recommends the mailing of a questionnaire for additional information in all cases where "Malaria" is shown as the cause of death.

The questionnaire should be so worded that the answers will permit the classification of malaria deaths under one of the following subheads:

Malaria
- (a) Estivo-autumnal
- (b) Tertian
- (c) Quartan
- (d) Unspecified

Such a questionnaire has already been tried out in Florida with very good results. Your Committee feels that it is necessary to have a more complete statement in connection with deaths from malaria in order to make available necessary basic information for future tabulations. Before making this recommendation, your Committee has had the approval of Dr. T. F. Murphy, Chief Statistician for Vital Statistics, United States Bureau of the Census, Dr. T. H. D. Griffitts, Dr. Mark F. Boyd, and a number of state health officers.

Your Committee recommends the adoption of this report and that a copy be sent to the state registrar in each state where malaria is prevalent with the request that the questionnaires become a part of the regular routine of the Bureau of Vital Statistics for gleaning additional information in connection with the mortality from malaria.

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†Chairman Sub-Committee on Statistics.

RESULTS FROM SCREENING OF RURAL HOMES IN LAKE COUNTY, TENNESSEE*

By HENRY E. MELENEY, M.D.,
and
JAMES A. CRABTREE, M.D.,
TENNESSEE*

In the summer of 1927 the Red Cross screened 165 rural houses in Lake County, Tennessee, as part of the flood relief program. The following year the Lake County Health Unit undertook the project of screening all the rural homes of the County. A screen door factory for making the U. S. Public Health Service type of door was established, a rotating fund was raised by a county antimalaria committee, and the health unit secured orders from landlords, made and installed the doors, screened windows, supplied cotton-sample wrapping paper for papering rooms, covered floor cracks with strips of tin, placed moth balls in chimneys and collected for the work on a cost basis.

At the National Malaria Committee meeting in November, 1930, Dr. J. P. Moon,[1] Lake County Health Officer, reported on the results of the work up to that time. His report stated that 84.5 per cent of the rural houses had been screened and approximately 27 per cent had been papered. The economic depression had made it impossible to secure the screening of the

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*From the Department of Preventive Medicine and Public Health of Vanderbilt University and the Tennessee State Department of Public Health.

remainder of the houses. Dr. Moon reported that the difficulty still remained of educating the people to maintain the screening in good condition, and that there was already considerable damage to the doors which had been installed.

The present report is an attempt to evaluate the effort which was made to reduce the incidence of malaria in Lake County by means of screening, and to give some idea of the structure and mosquito-proof condition of the rural houses of the County.

A screening survey of the County was made during the summer of 1931, in which the houses were classified according to their construction and the degree to which they were considered mosquito-proof. The defects in screening were also noted. The results of this survey will give some idea of the degree of protection afforded to the people at that time. Blood surveys by the thick-drop method have been made in the white schools of the County each spring and fall since 1928, and these will be used to indicate the trend of malaria incidence.

Lake County lies in the northwest corner of Tennessee, between Reelfoot Lake and its outlet on the east, and the Mississippi River on the west. It has an area of 156 square miles, which consists entirely of bottom-land. About two-thirds of the County was overflowed in the 1927 flood. The 1930 Census showed a population of 10,486, which Moon[1] states is increased by about 2,000 transients each summer during the cotton season.

As a control area for Lake County, Lauderdale County will be used. This County is the second county south of Lake County, bordering on the Mississippi River. It differs from Lake County in having both a hilly and a bottom-land portion. No concerted effort at screening or other malaria control measures have been carried out in Lauderdale County, except on one farm where mosquito-proofing and intensive treatment were instituted (Meleney and Griffin,[2] 1931) and in one isolated community where prophylaxis by means of plasmochin was attempted.

SURVEY OF THE RURAL HOUSES

The survey of occupied rural houses made in the summer of 1931 covered 1,816 houses, containing a population of 8,604 persons, or an average of 4.7 persons per house. The status of the families in these houses was as follows:

Owners 126, or 6.9 per cent
White tenants 1,088, or 60 per cent.
Colored tenants 602, or 33.1 per cent

The houses were classified on the basis of their construction into four classes. This classification was used previously in the study of a plantation in Lauderdale County,[2] and is as follows:

Class I is a house that has:

(a) Weatherboard or clapboard exterior
(b) A satisfactory roof
(c) Walls and ceilings of tongue and groove boards or plaster
(d) Tongue and groove floors
(e) Doors and window frames in good condition for screening

Class II is a house that has defects in not more than two of the above items.

Class III is a house that has defects in more than two, but not more than four of the above items.

Class IV is a house where mosquito-proofing is not feasible.

In this classification the houses were found to be grouped as follows:

Class I	171 houses	9.4 per cent
Class II	945 houses	52.0 per cent
Class III	494 houses	27.2 per cent
Class IV	168 houses	9.3 per cent
Not recorded	38 houses	2.1 per cent
Total	1,816 houses	100.0 per cent

It will be seen that about 90 per cent of the houses were in a structural condition to make mosquito-proofing possible, but that about 40 per cent were so constructed that weathering and long occupancy would be likely to make mosquito-proofing difficult.

A second classification was made on the basis of the degree to which the houses had been made mosquito-proof. In this classification they were found to be grouped as follows:

Mosquito-proof	163 houses	9.0 per cent
Screened and papered	931 houses	51.2 per cent
Screened	389 houses	21.4 per cent
No mosquito-proofing	283 houses	15.6 per cent
Not recorded	50 houses	2.8 per cent
Total	1,816 houses	100.0 per cent

In the inspection of these houses, observations were made as to the defects in screening, papering and structure which prevented complete protection against mosquitoes. In order to make a rough comparison between houses in regard to such protection, the houses were scored

according to the defects found. Taking 100 as a perfect score, the maximum deductions for defects in different items of structure were as follows:

Screen doors	35 points
Window screens	25 points
Walls	15 points
Ceilings	10 points
Floors	10 points
Chimneys	5 points
Total	100 points

Minor defects, of course, received smaller deductions than major ones. The total deductions subtracted from 100 represented the score given to each house. Although such an estimate is open to considerable error in individual houses, it should represent a fairly reliable picture of the county as a whole. *Table 1* shows the results of these observations. This table indicates that the large majority of the houses provided inadequate protection against mosquitoes. In fact, most of the 163 houses which were classified above as "mosquito-proof" had minor defects which prevented their receiving a perfect score. Structural defects, lack of completeness in mosquito-proofing and depreciation and misuse of screens all enter into the picture of incomplete protection which this table presents.

Table 1

MOSQUITO-PROOF CONDITION OF RURAL HOUSES IN LAKE COUNTY, 1931

Score	No. of Houses	Per Cent of Houses
100	34	1.9
90 to 99	240	13.2
80 to 89	343	18.9
70 to 79	292	16.0
60 to 69	273	15.0
50 to 59	237	13.1
Under 50	370	20.4
Not recorded	27	1.5
Total	1816	100.0

DEFECTS IN SCREEN DOORS

The individual defects found in each house were noted. A total of 5,462 doorways was recorded, being an average of 3 per house. There was no screen door in 1,040, or 19 per cent, of the doorways. Twenty-two and eight-tenths per cent of the screen doors were in perfect condition. Thirty per cent were recorded as not being the U. S. Public Health Service type of door. The defects encountered are shown in *Table 2* in the order of their frequency.

Table 2

DEFECTS FOUND IN SCREEN DOORS IN LAKE COUNTY, 1931

Defects	Screen Doors Showing Defects	
	Number	Per Cent
No door-strip	1638	37.1
New door-sill needed	1620	36.7
Screen kicked out at bottom	978	22.1
Tacks pulled out	869	19.7
Holes in screen	857	19.4
Joints loose or door needs adjusting	442	10.0
Door warped	437	9.9
Hook, eye or spring missing or defective	205	4.6
Hinge-strip loose	158	3.6

The door strip, absence of which was the commonest defect, is a one-inch strip along the top and free side of the door. It was omitted in screening many of the houses as a matter of economy where the door fit snugly against the house when installed, but would be a protective feature if the door became warped. The high percentage of door sills needing replacement is undoubtedly due to wear and tear, and represents a house defect which is not easy to overcome. The frequency with which the screen was kicked out at the bottom emphasizes the importance of a kick-board as part of the original door. This feature was added to the doors installed in the latter part of the screening campaign. The other defects are those which would be expected from careless handling. The fact that only about 10 per cent of the doors had shown warping speaks well for the cypress lumber used in construction.

A comparison of kitchen doors with other doors of the houses shows that fewer of them were in perfect condition and that each defect was more frequent in occurrence. Kitchen doors averaged 1.61 defects per door, while other doors averaged 1.18 defects per door.

DEFECTS IN WINDOW SCREENS

The total number of window openings recorded was 9,490, or an average of 5.2 per house. Of these window openings, 14.3 per cent had no screen. In addition, 32.2 per cent had screen over only half of the window frame and were therefore not health department screens. Of the screens in place 22.5 per cent had a mesh larger than 16 to the inch. These also were obviously not health department screens, and probably were mostly included among the half-screened windows. Thirty-eight and three-tenths per cent of the screens were in perfect condition, and were made of 16-mesh wire. The only defects noted were: tacks pulled out, 27.1 per cent; and holes in the screen, 6.2 per cent of the screened windows. The large percentage with tacks pulled out probably includes many

of the half-screened windows and, in addition, probably indicates deliberate damage by the occupants rather than poor installation, since there should be very little wear and tear on window screens.

DEFECTS IN ROOMS

The total number of rooms recorded was 5,967, or an average of 3.3 per house. Of the total number of rooms, 11.1 per cent were completely ceiled and needed no papering. This probably represents the houses referred to above as belonging to *Class I* in structure. Papering was satisfactory in 57.4 per cent of the rooms, while 27.9 per cent had no paper, and in 6.8 per cent the papering was incomplete or the paper was torn. In 6 per cent of the rooms the eaves needed caulking. This was much more frequent in kitchens, which are often lean-to rooms, than in the main rooms of the houses. Eleven and four-tenths per cent of the rooms had no ceiling of either board or paper, and 11.9 per cent had open cracks in the floor.

COMMENT ON CONDITION OF HOUSES

The above data indicate that although a tremendous effort had been expended by the county health department, the degree of protection afforded to the people from mosquitoes, even if they used what protection they had, was far from complete. If the protection available were well used, it is probable that the people would be bitten by a much smaller number of mosquitoes than if no effort had been made to screen the houses. To what degree the imperfectly screened houses acted as traps in which infected mosquitoes might incubate and infect others is impossible to state. Real house protection against mosquitoes involves three elements: a mosquito-proof house, keeping the mosquitoes from entering a house through the doors, and staying inside the house during the hours of mosquito activity. We have indicated that in Lake County the first element was imperfect, when the survey was made in 1931, and it is certain that the other two elements are not very well employed by most of the population. Furthermore, the screening must have deteriorated still further in the two years since the survey was made.

RESULTS OF MALARIA SURVEYS IN SCHOOLS

The school blood surveys in Lake County were started in the spring of 1928, those in Lauderdale County in the fall of 1929. The U. S. Public Health Service Bureau of Malaria Investigations assisted in taking the specimens of the first two surveys in Lake County, and examined most of the specimens from both counties until 1933, when a State Health Department technician took over the work. The county health departments have been responsible for taking the specimens in all the surveys since 1929. Thick blood drops stained and examined by Barber and Komp's method[3] have been used throughout.

Table 3 shows the results of the spring and fall blood surveys which have been made in the white schools of Lake and Lauderdale Counties. Sixteen schools in Lake County and 34 in Lauderdale County are included in this table. The schools of three large towns in Lauderdale County were not surveyed. Lauderdale County is divided into two groups, one including 13 schools situated either in the bottom-land or on

Table 3

MALARIA INCIDENCE IN BLOOD SURVEYS OF WHITE SCHOOLS, LAKE AND LAUDERDALE COUNTIES

County	Schools	1928	1929	1930	1931	1932	1933
Spring							
Lake	All	10.0	5.4*	9.0	5.3	2.2	3.0
Lauderdale	Bottom-land	—	—	3.8**	4.3	2.0**	9.1‡
	Hills	—	—	2.0	2.8	3.0	1.6
	All	—	—	2.5	3.2	2.8	2.9
Fall							
Lake	All	12.2	14.5	7.7	2.2	5.0	8.3
Lauderdale	Bottom-land	—	16.1	8.4	7.4**	11.9	14.3
	Hills	—	7.0	3.4	2.3	3.5	4.7
	All	—	8.8	4.3	3.6	5.4	6.6

*Ten schools out of 16.
**Ten schools out of 13.
‡Nine schools out of 13.

the bluff close to it, the other including 21 schools in the hilly portion of the County. The bottom-land schools are more comparable to those of Lake County in the topography of their location than are the hill schools. The hill schools have always shown a lower incidence of malaria than the bottom-land schools, except where they are near quadrimaculatus breeding places along tributary rivers. The spring surveys may be considered to give a fair idea of the residual malaria somewhere near the period of minimum incidence of each year. They were usually made in March, occasionally in February or early April. The fall surveys were made in late August or early September and represent the period of high or perhaps maximum incidence.

Taking the spring surveys first, it will be noted that in Lake County there was a steady trend of incidence downward through 1932. The incidence recorded for 1929 is not representative of the County because six of the sixteen schools were not in session because of the spring flood. The summers of 1930 and 1931 were very dry, and are reflected in the spring indices for 1931 and 1932. The summer of 1932 was normally wet, without a preceding spring overflow of the Mississippi River, and there is a resultant slight rise in incidence in the spring of 1933. In Lauderdale County, the first spring survey in 1930 shows a much lower incidence even in the bottom-land schools than Lake County for that year, and continues to show a lower incidence through 1932. In 1933, however, there is a sharp rise far above the incidence in Lake County. This may be accounted for partly by the necessary omission of four bottom-land schools from the Lauderdale County survey because of their inaccessibility during the spring flood. It probably represents, however, an actual increase of residual malaria carried over from the wet summer of 1932. The hill schools show a consistently lower incidence in the spring surveys, which, however, is higher than that in the bottom-land in 1932. The drop in incidence to 1.6 per cent in 1933 is surprising and impossible to explain at present.

In the fall surveys, it will be seen that the bottom-land schools of Lauderdale County have shown a consistently higher incidence than the schools of Lake County. In 1929 and 1930 this difference is not significantly large, but in 1931 and 1932 the Lauderdale incidence is respectively 3.4 and 2.4 times that of Lake County, indicating a much greater fall in Lake County in 1931 and a tendency to maintain a lower incidence in spite of the general malaria increase in 1932. In 1933 both counties show a continued rise, Lake County at a more rapid rate than Lauderdale, but still the latter has an incidence 1.7 times that of the former. The hill schools of Lauderdale County showed a moderately high incidence in 1929, an incidence not much above those of the spring surveys in 1930, 1931 and 1932, and a rise in 1933 to 4.7 per cent. When the indices for the two counties as a whole are compared, it is seen that the per cent positive in Lake County was nearly twice as high as that in Lauderdale in 1929 and 1930, was lower than that in Lauderdale in 1931 and 1932 and was higher again in 1933, indicating that the advantage which was gained from the dry summers and the mosquito-proofing was not maintained.

It is recognized that these surveys have certain limitations which should make one cautious in drawing definite conclusions from their results. The frequent omission of certain schools, the variation in the attendance of the schools, and the migration of people into and away from these counties may all have some influence upon the results. But it may be assumed perhaps that these variable factors would affect one county about as much as the other, thus balancing the errors enough to justify a comparison. Lake County appears to have experienced a greater decrease than Lauderdale in the incidence of malaria during the drought years. This may safely be ascribed to the effect of the screening campaign. The low level of incidence thus attained would provide a smaller reservoir of infection from which the subsequent increase would originate, so that the rise in incidence would be slower and the present difference in incidence between the two counties may not represent a great difference in the degree of protection from mosquitoes at the present time. The only conclusion which may be drawn from this study is that the screening campaign in Lake County apparently afforded for a time a partial protection against malaria. The data at hand would seem to indicate that because of the incompleteness of the mosquito-proofing and more particularly the lack of maintenance of the protection originally provided, the people in Lake County very probably will experience a recurrence of a high incidence of malaria unless new protective and educational measures are promptly carried out.

SUMMARY AND CONCLUSIONS

(1) In the county-wide screening campaign in Lake County, Tennessee, about 85 per cent of the rural homes were furnished with screen doors and windows between 1927 and 1930.

(2) A survey of the mosquito-proof condition of the houses in 1931 showed that although about 90 per cent of the houses were so constructed that mosquito-proofing was possible, only 9 per cent were actually mosquito-proof, 51 per cent more were both screened and papered, and 21 per cent were screened without further mosquito-proofing.

(3) Scoring of the houses in regard to their mosquito-proof condition showed that, with 100 representing a perfect score, about half of the houses received a score of less than 70.

(4) The commonest defects in screen doors, in the order of their occurrence were, absence of door strips, new door sill needed, screen kicked out at bottom, tacks pulled out, and holes in the screen. Kitchen doors showed more defects than other doors.

(5) In window screens not installed by the health department, the commonest defects were having only half of the window screened, and using screen with a mesh larger than 16 to the inch. The only other common defect was pulling out of tacks.

(6) Rooms showed varying degrees of defectiveness in walls, ceilings and floors.

(7) In order to estimate the value of the screening campaign in reducing the incidence of malaria, the school blood surveys made in Lake County since 1928 are compared with those made in Lauderdale County, where no extensive screening has been done. These surveys show the decrease of incidence due to the droughts of 1930 and 1931 and the subsequent rise in 1932 and 1933. They also show that the decrease in the drought years was greater and the subsequent rise less in Lake than in Lauderdale County.

(8) The conclusion is reached that the screening and mosquito-proofing in Lake County probably were responsible for the greater reduction in incidence of malaria there than in Lauderdale County in the drought years, but that its incompleteness and its unsatisfactory maintenance by the people have steadily decreased its value. Unless effective measures are taken to re-establish the protection Lake County is likely to experience a recurrence of a high incidence of malaria in the near future.

REFERENCES

1. Moon, J. P.: Possibilities of Mosquito-proofing All Rural Homes in a County. Sou. Med. Jour., **24**:434, May, 1931.
2. Meleney, H. E.; and Griffin, R. B.: Mosquito-proofing and Treatment in the Control of Malaria on a Plantation. Sou. Med. Jour., **24**:418, May, 1931.
3. Barber, M. A.; and Komp, W. H. W.: Method of Preparing and Examining Thick Films for the Diagnosis of Malaria. U. S. Public Health Reports, **44**:2330, Sept. 27, 1929.

DISCUSSION (*Abstract*)

Dr. George E. Riley, Jackson, Miss.—This paper, I believe, presents the most detailed and complete study that has been made in an attempt to evaluate the results of screening as a method of malaria control. It represents a large and fairly stable population, and has been conducted for sufficient time to add great weight to the conclusion that screening affords partial protection against malaria.

On the scoring method used in this study, I do not think that the average rural home in Mississippi would score as high as reported for Lake County. It would score, instead of 70 per cent, about 30 to 50 per cent. As the result of studies made in the Mississippi Delta three years ago, the conclusion was reached that negro tenants, as well as the white, care for and utilize screens. Further observation has shown that the screens are well cared for if paid for by the tenant, and that, when mosquitoes are not numerous enough to be a nuisance, the doors are propped open more often by the negro than by the white tenant. Yet, when a colored tenant moves from a plantation, he takes his screens with him.

In the Mississippi Delta, a general survey in 1930 of the houses screened following the flood of 1927 showed that about 75 per cent were in good repair. Surveys of two Delta plantations where $2,900.00 had been invested in screens showed, after one year, that only $25.00 was needed for repairs.

The defects found with screens are roughly about the same as exist in the Mississippi Delta, except that only in extremely rare instances is the door-strip absent.

During recent surveys along Sunflower River, about 50 to 60 per cent of the population gave a definite history of malaria and fully 30 per cent were taking or had, within the week, taken quinine. We have found that the blood index may be lower during epidemic years than during normal years due to the more prevalent use of quinine. I wonder if the taking of quinine might not be a factor in the 1933 drop in the spring survey of the hill schools?

Studies made by Coogle in Leflore County, Mississippi, in 1926 and 1928 indicate that the well-screened population has only about one-third as much malaria as the unscreened. A blood survey has just been completed in a hill county of north Mississippi, and 18.75 per cent of the group were found to be positive; 12.5 per cent of those in unscreened and only 6.2 per cent of those in screened houses were positive. A study made by Boyd in Missouri in 1921 indicates that good screens are a distinct advantage in malaria control and that even poor screens are better than no screens.

The planters of Mississippi who have completely screened their tenant houses say that screening pays them. The physicians who practice on these plantations are pleased with the results and report less malaria than on adjacent unscreened plantations. The tenants

who live in screened houses are satisfied. The public interest aroused by the great increase of malaria this year will aid in malaria control. Along with minor drainage, we shall promote screening to a greater extent than in the past.

Dr. H. A. Johnson, Memphis, Tenn.—It will be noted that the rural screening program was carried on in Lake County, Tennessee, from 1927 to 1929. The survey referred to in the paper occurred in 1931. The average life of the screens was therefore three years at the time of the survey.

At that time, namely, 1931, the authors report that 22.8 per cent of the screened doors and 38.3 per cent of the screened windows were perfect. The great majority of defects cutting down the percentage of perfect doors and windows were those of maintenance rather than initial construction. It might also be added that sealing of the rooms with paper was in the nature of maintenance work and was carried out after the house was screened.

Looking back over the entire project, what are the outstanding features that are of importance to public health engineers?

In the first place, the rural people of Lake County, Tennessee, have never before lived under and enjoyed the protection afforded by screens. Immediately following the installation of screens the depression appeared and since that time every penny they obtained has been used for food and clothing, and rightly so. Maintenance of screening on houses has been out of the question and I feel that the percentages of perfect screens quoted is an unusually good record when we consider all circumstances.

Secondly, while the reduction in the malaria rate was the thing primarily aimed at, and by the figures given it has amounted to somewhere around 50 per cent, the health protection afforded by screens has a far broader significance. Not only can we expect to reduce malaria prevalence but typhoid as well, and last but by no means least, screened homes serve to cut down to a very large degree the usual fly-borne intestinal disturbances of infants and children which are adding heavily to the death rate in these groups. Past history has shown this aspect of screening very strikingly and while figures are not available for Lake County, I feel this is one of the intangible results which has followed screening there.

Thirdly, screening tends to create a desire for better and more comfortable living conditions. It is a fact that as screening progressed in rural sections of Lake County it became increasingly difficult for plantation owners to hold labor on unscreened plantations and instances are recorded where tenants upon moving took their screens off, carrying them to the new abode and reinstalling them. Also the County Health Officer has informed me that contrary to all expectations the rural people have the year round approached him for paper to apply to their homes, not only to keep insects out in summer, but to make the house warmer and more comfortable in winter, a twofold year-round project.

Fourth, the fundamental aim in screening the admittedly almost unscreenable rural houses we find today has, I believe, one main purpose, and that is to create a demand for better living conditions so that as new houses are built they will be so constructed that they can be screened economically and made more comfortable; in short, that they will be a home rather than a shelter. That this idea is taking shape is evidenced by a paper read before the last meeting of the Committee by a representative of the Tennessee State Health Department giving standardized plans for rural houses for various sized families.

In conclusion, I feel that the paper gives valuable statistical data on county-wide screening that health officials will do well to analyze carefully. It points out the weak spots in the program, thus indicating a way to make screening more efficient and calling attention to a possible method of promoting the general health of rural peoples.

HELPING THE MINNOWS*

By M. A. FORT, M.D.,
Bainbridge, Georgia

My earliest memory of childhood is connected with a little creek that ran near my home in southern Alabama. There I learned to swim, and became expert in scooping up Gambusiae with my hands.

One day I caught a large pot-bellied minnow and gave it an experimental squeeze. This obstetrical venture deposited in my hand a number of wiggling little minnows. I thought I had committed a great crime, so I washed my hands and, hiding away to figure out the mystery, came to this conclusion:

"I have already found out there is no Santa Claus;
That rabbits do not lay eggs at Easter;
Now I know they were lying to me about the stork;
And I bet they were stuffing me up about the devil, too;
I have lost my religion and I don't believe nothin'."

Soon we moved to a new home in town, and my contribution to the beautiful flower garden was some lily pools made by burying barrels with the mouth openings level with the surface of the ground. I soon had waterlilies and also rafts of mosquito eggs, wiggletails, tumblers, and by watching I learned about eggs and tumblers hatching from them. But alas! the house filled with mosquitoes, and my father ordered me to fill up the pools with dirt.

Like all little boys in trouble I went to my mother, who knew more about public health than most of us have learned in a lifetime, and she suggested that I go down to the creek and catch a few minnows to put in the pools. This I did, and the wiggletails rapidly disappeared.

---

*Read before National Malaria Committee (Conference on Malaria), meeting conjointly with Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

It was customary at that time for people to put perch and even catfish in their wells. While these fish are not good mosquito destroyers in a pond, yet when they are in a well and unfed, they look upward toward the only light far above, see the wiggletails, which they promptly destroy.

Gentlemen, I was doing successful mosquito control 55 years ago, before most of you were born.

Apparent Successes with Minnow Control.—Walking down a creek bed in a gully in Quitman, Georgia, in 1920, I found that every pot hole without a minnow was breeding mosquitoes, while every hole with even one minnow was free from mosquito breeding.

A large excavation occupying a small city block near the depot at Quitman was drained by a drainage well at the edge, but seepage formed a little stream which constantly trickled into the well, and enough mosquitoes were raised in this stream to infest the town. I put in about 24 minnows, expecting them to go down the well with the first rain. However, they cleared up the wiggletails, and three years later they were maintaining good control.

You all remember Hackett's[1] description of the introduction of Gambusia in Italy, where they became so thick that the stock would not drink, and malaria was reduced almost to the vanishing point.

A similar report comes from Russia, near the Black Sea.

You will also remember Hildebrand's[2] classic experiments near Augusta, Georgia, in which he repeatedly showed that if the surface of the water was cleared, wiggletails disappeared entirely in the presence of minnows.

These things apparently make a good case for Gambusia.

Apparent Failures with Minnow Control.—But Hackett[3] also reports that in Sicily the Gambusiae never became numerous and were inefficient, even in streams with well cleaned borders. All of us have noticed that in some places the minnows die, and in others they never become numerous.

Years ago I noticed in a stream receiving the waste from a packing plant at Moultrie, Georgia, that schools of larvae and minnows were mingling on apparently good terms. The minnows were probably overfed with waste which they liked better than they liked wiggletails.

Years ago, the Georgia State Board of Health advocated for towns a plan of clearing the ponds and introducing minnows. This plan quite generally failed because people remembered about the minnows, but they apparently never even heard what was said about clearing the surface. And if they had heard, it would have failed, because an untrained man cannot or will not clear a pond surface properly any more than he will follow directions about making a sanitary privy.

An Encouraging Practical Experiment.—June 1, 1925, the "Monterey Hole," a small limesink lake in the northeast corner of Colquitt, Georgia, was breeding mosquitoes intensely, in spite of numerous minnows. Coontail moss and other growth made a surface mat extending out into the pond for 20 feet all around. We took two negro prisoners and waded in and found we could roll up the growth like hay and drag it out. In half a day the pond was cleared. A week later no larvae could be found. The people sat on their porches in comfort, and the town was practically free from malaria for the first time in thirty years.

I had always thought of this as an unquestionable demonstration of the value of Gambusia until Dr. L. L. Williams said that in clearing ponds and introducing minnows, the control was about as good in ponds in which they forgot to introduce the minnows as in the ponds that were well stocked: that is, he thinks the clearing rather than the minnows is what prevents the breeding.

First Extensive Tests.—I had no chance to test the clearing and minnow control further until this year. We have a limesink country and the level of many ponds is lower than that of the creeks and rivers. Numerous creeks run along for miles and disappear into the ground. When I refer to a pond in this discussion it is such a pond and cannot possibly be drained. We could get no money for apparatus, oil, or Paris green, but only a little very inefficient R.F.C. labor.

Three ponds three miles south of Bainbridge had been breeding heavily for years.

Pond 1, 150 feet long and 100 feet wide, was surrounded and invaded by buttonwood and other bushes, various water grasses, brush, dead trees, floatage, Gambusia, bream, jack, cat, turtles, lamprey eels, and moccasins. An experimental dip showed over 50 larvae. I jumped in up to my armpits and told the men to fol-

low. We cleared the pond at a cost of $2.50. A week later leaves and other stuff stirred in the water had risen and made enough floatage to get 30 dips, securing 8 larvae. I made what I call a "follow-up," correcting slight defects and failures. This cost 25 cents. Next week I could find only 3 larvae in some hair-like roots hanging from a tree. I dipped completely nearly every week all summer, but only once did I find three larvae in some floatage brought in by a hard rain. One thorough clearing and a follow-up of a few minutes controlled this pond for a year.

Pond 2 was a circular limesink 40 feet in diameter, with some grassy edges, and a shallow part about 30 feet in diameter. The shallow part was covered with a mat of vigorous surface-floating grass, resembling Bermuda, very difficult to clean thoroughly, as much grass sank, and rose again by next day. A week later a thorough dipping showed a reduction of better than 90 per cent, but still some larvae. A follow-up costing 35 cents produced a reduction of 98 per cent. Following this, weekly dippings showed from zero to three larvae until late in July, when a road crew working near turned their ditches into this pond and some big rains flooded the pond out into the woods. Some larvae reappeared, probably reaching 25 per cent of the spring peak, though few *quadrimaculati* reappeared until September. Then four men in half a day did a fair but incomplete job, and we found a few larvae in overlooked places until the water fell, when they disappeared.

This pond had two clearings and a follow-up and the average breeding for the year was reduced over 90 per cent. It should have had three complete clearings, but help was not available promptly.

Pond 3 was a large limesink of about an acre, including a grassy shoal at one end and a shallow grassy pool connected at the side. Many willows and buttonwood were cut away, weeds were removed, and much grass. Excepting the deep center of the sink, the main body of the pool was covered with a hair-like grass, *Eliocharis acicularis*, or spike rush. We tried to remove this grass at first, but succeeded only partially, and the grass appeared again. But in spite of intensive dippings all summer we never found breeding in this grass, though it seemed thick enough to offer harborage. Whether the mosquitoes dislike this grass, or whether it offers insufficient protection from the numerous small minnows, I do not know. But S. L. Evans, Inspector for the Florida Power Corporation, tells me that he has never found breeding in this grass unless there is much other grass, algae, or floatage mixed with it.

This pond was cleared as were the others. A week later many dips revealed only one larva, but this pond received the same follow-up as the others. After that, weekly dippings found only 2 larvae until August, when the heavy rains brought in much water through the new road ditches. We cleared it again and found no more larvae at all.

The clearing of these three ponds, including the follow-up, cost $8.50, and reduced the breeding from thousands of imagines a week to a negligible number. The fall clearing of ponds 2 and 3 should have cost $2.50, but really cost $12.00 due to the advance of such labor to $2.40 a day.

To have accomplished the same results with Paris green would have cost from 4 to 6 times as much, besides the buying of the apparatus and providing for weekly inspections. Paris green control will cost as much the second year and will not control the *culex*. But each subsequent clearing becomes cheaper and controls also the *culex* varieties.

A fourth pond was found at Faceville, July 14, breeding heavily, all varieties. Six men were sent there without proper supervision, and though the work was imperfect, we have been unable to find even a single larva since that time.

Thus we see that two of these ponds were completely controlled with one clearing, two others were reasonably controlled by two clearings, but the little dirty pond should have had three clearings.

Most of our bad breeding ponds are of a limesink nature, shaped like a bowl, and when once cleared subsequent clearings can be made with about the same work as chopping a row of cotton as long as the circumference of the pond. Many of these ponds, when cleared once in the spring, will fall all summer and require no further clearing. An unusual summer, having continual heavy rains, may make an extra clearing or two. But if properly done at first, each subsequent clearing will be easier and in the great majority of cases the results will be as good and the cost far less than when Paris green is used.

What Does the Work, Clearing, Minnows, or Insects?—Now, what part of the good results is due to minnows? Certainly if the minnows

are there they follow the workmen in schools and eat every larva they can find. But when there are no minnows, why do the larvae tend to disappear anyway? Do the mosquitoes refuse to deposit their eggs unless they find surface harborage? Or do other insects and larvae destroy the mosquito larvae in a cleared pond? In this work I discovered a small diving beetle like a ladybug, a larger beetle, and a very large beetle with horns, a larva with pincers called a water tiger, and larvae of various dragon flies, all of which proved voracious destroyers of mosquito larvae. So I do not know how much of the good results are due to the discouragement of the mosquitoes by the lack of harborage for depositing their eggs, and how much to these enemies. But I am inclined to think these enemies are the principal factors.

Cost of Clearing Small Versus Large Ponds.—It is often stated that we can afford to control small ponds by clearing, but not large ponds. Why not?

Consider a pond one acre square, or about 70 yards on a side. To clear the border of such a pond you would have to clear 4 times 70 yards, or 280 yards of pond border. Take a hundred such ponds, and you would have to clear 100 times 280 yards, or 28,000 yards of pond border. But take one square pond as large as the entire 100 one-acre ponds added together, and you would have to clear a border only 4 times 700 yards, or 2,800 yards, just one-tenth as much as the 100 one-acre ponds.

We have on Spring Creek the Georgia Power and Light pond, 8 miles long and from 100 to 600 yards wide, with islands, shoals, willows, buttonwoods and various growths. They dust about 22 times a year at a cost of $1,500.00. Great jelly-like accumulations float up to the borders, bushes and vines, have gotten so thick that in places it is difficult to get a good distribution of Paris green; and in spite of good work we sometimes find considerable breeding in the thickets. While I doubt that such a pond would lend itself to economical clearing, yet I am not sure but that after a few years it might prove successful. It will soon have to be cleared again in order to dust it properly.

But in the woods 4 miles south we have Silver Lake, practically the 100-acre pond I used in the illustration above. It is a beautiful clear lake, surrounded by large cypress trees. There is very little grass and underbrush, only an occasional fallen limb or other object that has accumulated a surface mat, and in such places we find *quadrimaculati.* But we figure that a single man could clear one hundred yards of this border in a day, and a crew could clear it all in a very few days. So we are clearing that pond, and expect to see improved conditions. We are also clearing an 8-acre mill pond under the owner's agreement to keep it cleared. We are clearing half a dozen small sinks near a home in which malaria has cost the family an average of $100.00 a year under an agreement that this family will keep it cleared. I expect to stay behind these people and see that these things are done.

CONCLUSIONS

In conclusion I wish to say:

(1) I am suggesting this method only for ponds which for physical or financial reasons are impossible to drain.

(2) The method has repeatedly worked successfully in my hands at a far lower cost than the use of Paris green.

(3) The amount of work and the number of clearings per year vary greatly with the nature of the pond and the amount and time of rainfall.

(4) With constant attention the expense will grow less from year to year.

(5) These trials were all made in the limesink region of south Georgia and may not be applicable everywhere.

---

*Identifications made by Dr. S. F. Blake, Bureau of Plant Industry, Washington, District of Columbia, and by Dr. P. W. Fattig, Curator of the Museum, Emory University, Georgia.

REFERENCES

1. Hackett, L. W.: Recent Developments in the Control of Malaria in Italy.
2. Hildebrand, S. F.: Fishes in Relation to Mosquito Control in Ponds. U. S. P. H. Reports, Reprint 527, May 23, 1919.
3. Hackett, L. W.: Malaria Control Through Anti-Mosquito Measures in Italy. Trans. Royal Soc. Trop. Med. & Hyg., 22: No. 6, April, 1929.

Southern Medical Journal

JOURNAL OF THE

SOUTHERN MEDICAL ASSOCIATION

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $4.00. Single copies 35c each.

Entered as second-class matter at the Post Office at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1106, Act of October 3, 1917, authorized December 20, 1921.

M. Y. DABNEY, M.D., Editor
EUGENIA B. DABNEY, M.S., Assistant Editor
C. P. LORANZ, Secretary-Manager

Volume 27 JUNE 1934 Number 6

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Eighth Annual Meeting
San Antonio, Texas, November 13-16, 1934

CAUSE OF ACUTE RHEUMATIC FEVER

Many diseases, for examples, malaria, syphilis, gonorrhea, diphtheria, tuberculosis, are manifestly due to a single bacterial agent. There are others, such as colds and influenza, rheumatic fever and trachoma, concerning the etiology of which bacteriological investigations have been very extensive. However, complicating factors have made it difficult to establish a specific etiology. In acute rheumatic fever, the hemolytic streptococcus[1] has been repeatedly incriminated and the evidence has been as ably disputed.[2] A *Diplococcus rheumaticus*[3] has been depicted. Climatic conditions are thought greatly to influence the course of the disease, and a warm or tropical climate is advised, though the disease is not absent from subtropical zones such as Florida.[4]

A rather new viewpoint is introduced by dietetic studies from the University of California, where Rinehart and Mettier[5] report the production of the disease in guinea pigs by a combination of methods. Their animals were kept on diets low in vitamin C until a subacute scurvy developed. They were then given intracutaneous injections of *Streptococcus hemolyticus*, and in some instances of another bacillus.

The pathologic diagnosis in acute rheumatic fever is believed by many to depend upon the demonstration of Aschoff bodies in the myocardium. The basic defect of the scorbutic animal, say Rinehart and Mettier, is an inability to form normal intercellular substances such as dentine or collagen. An imperfect cement throughout the body results. The heart in uncomplicated scurvy, they say, shows definite atrophic and degenerative changes in the collagenous stroma of the valves. The picture is not that of acute rheumatic fever, but it is a pathologic foundation upon which lesions closely resembling the Aschoff bodies can develop. In scorbutic animals which received injections of bacteria, an experimental endocarditis developed like that of acute rheumatic fever, and striking heart lesions which closely resembled the Aschoff bodies. The pathologic picture was not obtained as a result of the dietary deficiency alone, nor of the infection alone, but in scorbutic animals with a superimposed infection. Rinehart and Mettier believe that the bacterium was not specific.

These studies will of course await further proof. Another dietary deficiency, rickets, due to insufficient vitamin D, is said to produce a defective intracellular cement.[6] A variety of clinical syndromes possibly depends upon long-continued mild or severe dietary deficiencies of different types. The diagnostician always does well to inquire into the nutritional history of his patient. The daily menu is often defective even among the comparatively well-to-do, since taste is not a dependable guide to healthful living. It is difficult to imagine a disease in which harm would be done by the feeding of vitamins unless, of course, one administers large doses of such a concentrate as viosterol.

Acute rheumatic fever has been called a disease of poverty.[1] Inquiry into the dietary habits of patients, particularly their vitamin intake, might furnish evidence as to the vitamin

1. Coburn, A. F.; and Pauli, R. H.: Observations on the Etiology of Hemolytic Streptococcus in Relation to the Epidemiology of Rheumatic Fever. Jour. Exp. Med., **56**:609-676, 1932.

2. Weinstein, Israel; and Styron, N. C.: Bacteriologic Study of Throats in Rheumatic and Non-Rheumatic Fever, with Special Reference to Hemolytic Streptococci. Arch. Int. Med., **53**:453, March, 1934.

3. Poynton, F. J.: Rheumatic Fever. McCrae's Osler, p. 165. Philadelphia: Lea & Febiger, 1925.

4. Bitzer, E. W.; and Cook, Geo. L.: A Clinical Investigation of Incidence of Rheumatic Heart Disease in a Subtropical Climate. Sou. Med. Jour., this issue, p. 503.

5. Rinehart, J. F.; and Mettier, S. R.: Heart Valves and Muscle in Experimental Scurvy with Superimposed Infection, with Notes on the Similarity of the Lesions to Those of Rheumatic Fever. Amer. Jour. Path., **10**:61, Jan., 1934.

6. Clark, George L.; and Mrgudich, J. N.: An X-Ray Diffraction Study of the Effect of Rachitis upon the Structural Characteristics of Bone. Amer. Jour. Phys., **108**:74, April, 1934.

deficiency theory. Vitamin C, it will be recalled, is most abundant in the juice of fresh raw fruits and vegetables such as oranges or tomatoes. Fresh turnip juice[1] is described as an excellent cheap source of this accessory food factor. Vitamin C is readily destroyed by heat, and is therefore lost in many of the processes of cooking.

RESPONSE TO INSULIN

In a recent number of the *Bulletin of the Johns Hopkins Hospital,* is a review of carbohydrate metabolism, by Macleod,[2] formerly of the University of Toronto, now of the University of Aberdeen. The many investigations on the subject, mainly during the decade-plus since the discovery of insulin, are discussed. The effect of the secretion of the islets of Langerhans upon the storage of glycogen (animal starch) in the liver and muscles, Macleod notes, is still in dispute, because it varies with a surprising number of factors. In diabetics, insulin causes storage of glycogen in the liver, and clinical improvement; in normal animals no storage of glycogen results. On the contrary, one may get a discharge of the liver glycogen. In the laboratory, the type of anesthesia employed, particularly the last few struggles of an animal going under an anesthetic such as chloroform or ether, profoundly affect glycogen deposits. Age is a further confusing factor. Insulin increases the liver glycogen of young rabbits, and decreases it in adults. These facts are to be considered when insulin is given to non-diabetics, postoperatively, or to increase weight. There are likewise species variations in the reaction of glycogen storage after insulin injections, which make it difficult to correlate clinical and laboratory studies. The use of insulin by the body is apparently somewhat dependent upon the body's need of it.

The inorganic constituents, iron, carbon, nitrogen, oxygen, calcium, magnesium, phosphorus, sodium, chlorine, and so on, of men and the lower organisms are the same, and very much the same as those of the ocean. As Mathews has said, "We are children of the sun and the sea." The simple organic materials of the human body, such as sugars, amino acids, uric acid of the blood and many of the hormones, are likewise remarkably repeated in the lower animals. Probably one should say they are repeated in the higher animals after having been extensively tried in the lower. Their quantities in the blood, even, in different species, show a considerable similarity. The fasting blood sugar for the pig, dog, sheep, rat, cow, rabbit and human are not far apart. For the fowls the value is twice as high, and birds are remarkably resistant to insulin. A comparatively much larger dose of insulin is needed to reduce their blood sugar below its normal threshold. All warm blooded animals, says Macleod, respond much more quickly to the hormone than do cold blooded.

The previous diet likewise affects the susceptibility of laboratory animals to insulin. A group of protein-and-fat-fed animals is much less resistant than a group which has been kept on a high carbohydrate diet. This is to be considered, Macleod suggests, in the treatment of insulin-resistant human cases. Again, insulin resistance may vary with the time of day, mice being more susceptible in the morning than in the afternoon. Species, age, presence or absence of disease, previous diet, and time of day, are among the many experimental factors which may influence insulin resistance.

Ten years ago the answer to the question, what happens to the sugar which disappears from the blood after insulin injection, seemed much nearer solution than it does today. The only answer which may now be given, says Macleod, is that it goes to form some intermediary substance of carbohydrate metabolism which has not as yet been identified.

Something may be learned of insulin physiology by study of its antagonist, epinephrine, which raises the blood sugar. "The direct action of insulin is apparently restricted to carbohydrate metabolism, whereas that of adrenalin is multifarious, the basal metabolism, the blood circulation and many other functions being affected by it."[2] After epinephrine injection, there is a decrease in muscle glycogen and an increase in liver glycogen; lactic acid accumulates in the blood, its concentration running parallel to that of the increasing sugar; and hexose phosphate (a sugar-phosphorus compound) accumulates in the muscles.

Macleod does not mention the production of glycosuria or experimental diabetes, by injections of anterior pituitary extract,[3] which usually also causes the blood fat to increase. He does not discuss the relation of carbohydrate to

1. McHenry, E. W.: An Economical Antiscorbutic Supplement. Ca. Med. Assn. Jour., **30**:183, Feb., 1934.

2. Macleod, J. J. R.: The Control of Carbohydrate Metabolism. Bulletin of the Johns Hopkins Hospital, **54**:79, Feb., 1934.

3. Evans, E. I.: Diabetogenic Principle of the Anterior Pituitary. Proc. Soc. Exper. Biol. & Med., **30**:1570, 1933.

fat or mineral metabolism, which are affected more or less directly by insulin injections.

The wonder is not that the entire phenomena of insulin physiology have failed of elucidation, but that medical men can treat with great success a frequently occurring disease, diabetes, while knowing only a small part of what occurs. In spite of the many blank pages in the story of its effects, the reaction of diabetes to insulin is predictable in the majority of cases. With increasing knowledge, the practical use of insulin will, undoubtedly, continue to increase.

GLEANINGS FROM RECENT JOURNALS

Muscular Dystrophy.—In muscular dystrophy and atrophy, oral ingestion of amino acids, particularly glycine, is rather widely believed to be beneficial, the first favorable report having come in 1932. Glycine, CH_2NH_2COOH, is the simplest building stone of the protein molecule.

In these muscular diseases, say Tripoli and Beard,[1] of New Orleans, there is a defect of protein metabolism, making the patient unable to assimilate creatine. If the patients take simple amino acids by mouth, there is clinical improvement with improvement in the creatine metabolism. Protein and amino acids increase the creatine content of the muscles of young rats, and this is considered a possible explanation of the improvement following ingestion of protein split products by patients of this type.

In fifty-one of the sixty-nine cases so far described in the literature, the New Orleans authors say, improvement was observed after amino acid therapy. In some of their own cases glutamic acid was used, as being cheaper than glycine and equally effective.

Function in a Partially Severed Nerve.—In a patient whose optic nerve had been divided in more than half of its cross section, says Dandy,[2] vision returned to normal. No difference could be determined between the vision of the intact and of the partially severed optic nerve. After section of five-eighths of the acoustic nerve, there was no postoperative loss of hearing. The immediate result following section of one-half of the cochlear branch of the acoustic nerve was loss of only two of the very high tones. It is evident, says Dandy, that there is a redundant supply of fibers in the sensory root of this as well as other cranial nerves.

Energy and Estrin.—The indolence and apathy of many spayed or castrated domestic animals is well known. According to Richter and Hartman,[3] of Johns Hopkins University, spontaneous activity of gonadectomized animals by laboratory measurements also is much below normal. Removal of ovaries or testes in rats produces a great permanent decrease in their running activity, and the movements of these sluggish animals can be markedly increased by implantation of the missing tissue. Richter and Hartman have studied the effects of amniotin, a preparation of estrin, the hormone of the ovarian follicle, upon normal as well as gonadectomized male and female rats. The animals were kept in a cage which accurately recorded their movements.

Amniotin caused the spayed females to become as active, if not more active, than the normals. It had also, surprisingly enough, a very definite stimulating effect upon the castrated males, which became more active than the untreated, though their motility was still below the normal male average. Amniotin was able to replace the testicular secretions, as a stimulant to voluntary motion.

Amniotin given to normal rats, however, had an opposite effect. It caused an immediate drop in their activity which lasted about fifteen days. The activity then returned rapidly to its former level, but did not go beyond.

At autopsy, the uteri and ovaries of the spayed, estrin-injected females presented a perfectly normal picture. The castrated estrin-injected males showed the expected atrophy of the remaining sex organs, with prostate and seminal vesicles small or absent to inspection.

The Baltimore authors suggest that the hormone estrin contains a factor specific for activity, and independent to a large degree of the sex factor.

Since the activity of normal control animals was not increased by estrin, one cannot hope that this is the long sought cure for human laziness.

1. Tripoli, Carlo J.; and Beard, Howard H.: Muscular Dystrophy and Atrophy: Clinical and Biochemical Results Following the Oral Administration of Amino-Acids. Arch. Int. Med., **53**: 435, March, 1934.

2. Dandy, W. E.: The Effect of Hemisection of the Cochlear Branch of the Human Auditory Nerve. Bull. Johns Hop. Hosp., **54**:208, March, 1934.

3. Richter, Curt; and Hartman, Carl G.: The Effect of Injection of Amniotin on the Spontaneous Activity of Gonadectomized Rats. Amer. Jour. Physiol., **108**:136, April, 1934.

TWENTY-FIVE YEARS AGO
FROM JOURNALS OF 1909

Kidney Action.—"The removal of potassium salts and chlorides from the blood by the kidneys is not due to filtration but to forces which may be termed 'secretory,' that is, it is caused by an activity which is apparently selective or differential."[1]

Diabetes.—"Dr. Alfred King, Portland, Maine. His investigations had been carried on only very recently, but as he had been able to get a pure culture of yeast fungus, *saccharomyces cerevisiae,* from the blood of every diabetic patient examined, it seemed probable to him that this germ was the cause of the disease. * * * He was quite aware, * * * that he had not gone far in his investigations, but he trusted that he had gone far enough to interest other investigators in this subject.

"Dr. C. E. deM. Sajous, Philadelphia, said that division of the splanchnics which contained the nerves going to the adrenals, had been shown to affect the sugar in the urine. The adrenals were governed by the sympathetic system and it would appear that the pituitary body was the center for this system. * * *

"Dr. L. Kalipinski had found a solution of calcium creosote notably useful in pneumonia and typhoid fever (where it efficiently reduced the temperature, obviating all necessity for cold baths or packs); also in cholelithiasis, scrofulous keratitis and nasal catarrh, hemorrhage, summer diarrhea of infants and tubercular disease of the bones and joints. In pulmonary tuberculosis no benefit had been derived from its use."[2]

Women's Auxiliary.—"The wives of members of the Medical and Chirurgical Faculty of Maryland met at the new Medical Hall May 25 and organized the Ladies' Auxiliary of the Widows' and Orphans' Fund and entered on an active campaign to raise a large fund, to be immediately available for this excellent charity."[3]

Quinine.—"During the calendar year of 1908 more than a ton and a quarter of quinine was used by the department of sanitation in the Canal Zone for the prevention of malaria by administering prophylactic doses, to supply a tonic to the employes, and in the treatment of the 12,372 cases in the hospital, and the 23,000 cases in the sick camps. Quinine is dispensed free to any one who applies for it, whether he be an employe of the commission or not."[4]

Amebic Dysentery.—"I have treated all of our amebic dysentery patients for the past ten months with undiluted coal-oil.* * * The patient * * * is placed in the inverted position, the proctoscope is introduced and any amount of oil, from one glassful to a quart or more of undiluted coal-oil, is poured into the bowel; the patient is then requested to remain in the recumbent posture for a half hour or longer. * * * All our patients have responded satisfactorily to this treatment with the exception of two."[5]

1. Macallum, A. B.; and Benson, C. C.: Jour. Biol. Chem., **6**:87, 1909.
2. Report of Tenth Annual Meeting of the American Therapeutic Society held at Yale University, New Haven. Boston Med. & Surg. Jour., **160**:787, 1909.
3. Medical News, Baltimore. J.A.M.A., **52**:1844, 1909.
4. Medical News. J.A.M.A., **52**:1847, 1909.
5. Hanes, Granville S.: Amebic Dysentery. J.A.M.A., **52**: 1990, 1909.

San Antonio—Where We Meet

SAN ANTONIO*

For more than two hundred years San Antonio was Texas' largest city; it is one of the oldest cities in the United States. A municipality long before the men who founded Dallas and Houston were born, it developed and expanded with an unhurried dignity that became its venerable age and exalted station. The people of San Antonio have learned that they can enjoy their prosperity more if they take time out to live.

Ancient documents reveal that a settlement existed at the present site of San Antonio as early as 1692. It was established as a city by the King of Spain in 1731 and still retains its original city limits. It was an outpost of the Spanish explorers in North America for many decades before 1731. Since that time a rich and colorful history has ordained that it should be the seat of political government for Spanish viceroys and Mexican governors. Today it is the headquarters of the largest military establishment that flies the Stars and Stripes.

Towering structures compose the skyline of modern San Antonio, but within their length-

*Prepared by Mr. Howell W. Jones, Secretary, Convention Department, San Antonio Chamber of Commerce, for Dr. P. I. Nixon, Chairman of Publicity for the Southern Medical Association's San Antonio meeting.

Skyline of Down-town San Antonio.

ened shadows lie the picturesque realities of another day and another civilization. It is a romantic blending of the old and the new, the Latin and the Anglo-Saxon perspective. San Antonio's "Little Mexico" is more truthfully Mexico than is San Francisco's Chinatown China. And it is infinitely older. Moreover, preserved in and near the city, are the shrines of Texas history, monuments to Spanish rule and Mexican dictatorship, the Alamo, San Fernando Cathedral, missions built by the calloused hands of soft-spoken Spanish priests, and the palace in which resided the viceroys of the King of Spain.

Today San Antonio is the center of a vast agricultural empire roughly described as South and Southwest Texas. Yet, without intending to minimize in the least its commercial importance, the city's staunchest friends must confess that San Antonio's chief attraction is for those who are inclined to punctuate their pursuit of prosperity with periods of healthful play.

Lying in the heart of a fruitful valley seven hundred feet above sea level, San Antonio lays especial claim upon the affection of the sun. Appropriately enough, it has been dubbed "the city where the sunshine spends the winter," and it is, unquestionably, the Southwest's favorite playground.

To fortify the vacation appeal of its climate and naturally beautiful environs, San Antonio has dedicated to the enjoyment of its inhabitants and visitors more than 2,000 acres of parks and playgrounds. One of these parks, Brackenridge, is world famous for its Japanese Sunken Garden, its zoological gardens, and its innumerable bridle paths, swimming pools, tennis courts, golf links, polo fields, baseball diamonds and picnic facilities. For those who prefer natural beauty unadorned there is Olmos Park with its 1,200 virgin acres assigned to the public use. Large and small, the city is dotted with more than three score parks and plazas of various sizes and attractions.

Were this not enough, the hill country north of San Antonio and the broad plateaus that stretch southward into Mexico offer the sportsman a variety of hunting and fishing not found elsewhere in the United States. These regions abound in deer, wild turkey, duck and geese, doves and quail. Fine concrete highways, in from half to three-quarters of an hour, take the sportsman to the country's finest freshwater fishing preserves; and in three or four hours to the deep sea game fish that swarm off-shore in the vicinity of Corpus Christi bay (Bexar County and San Antonio are reputed to excel all other American communities in the quality and quantity of their paved highways.)

San Antonio's tourist industry ranks among its most profitable enterprises. Thousands of Northern people spend their winter months in the sunshine of San Antonio and its adjacent playgrounds. Other thousands use it as the gateway for travel to Mexico, only a few hours from San Antonio by rail or by any one of a dozen fine automobile trafficways.

As a center of aviation, San Antonio has no peer in the South and West, and few in the country. Besides a number of private landing fields it has three airports and five army aviation fields. One of the latter, Randolph Field, is the Army's "West Point of the Air." The ultimate government expenditure at Randolph will approach $50,000,000.00. Regular passenger, freight and air mail service is maintained out of San Antonio by several transport lines and there are daily schedules north, east, south and west. The city is the logical junction point for international air mail lines serving Mexico City, Canada and points in the United States.

The military establishment at San Antonio,

rated as the nation's largest military concentration, is of economic importance as well as popular interest. Army activities in four states are directed from headquarters of the Eighth Corp Area, located at Fort Sam Houston, which lies within the city's corporate limits. The famous Second Division of the United States Army is quartered at this post, and aviation training centers include, besides the "West Point" at Randolph, Kelly, Brooks, Dodd and Duncan Fields.

From the strictly commercial viewpoint, one will be impressed with the economic importance attached to San Antonio as the manufacturing, distributing and financial center of South and Southwest Texas. Within this territory, and most of it is in a state of partial rather than complete development, is produced all the mohair, most of the wool and one-fourth of the Texas cotton crop. More than one-half of the early cabbage, nearly one-half of all the spinach, three-fourths of all the Bermuda onions and a rapidly growing share of the early white potatoes marketed in the United States are grown in this area. According to authorities at Texas Agricultural and Mechanical College, farms in the San Antonio territory can produce a greater variety of agricultural products than any similar area in the world. Of the agricultural section, a vast portion may be dry-farmed profitably, although there are available some of the greatest irrigation projects in the United States.

To serve this great productive territory, San Antonio has established in the neighborhood of 390 factories, employing 8,660 wage earners, with an output valued in excess of $52,884,256. Its factory payroll approximates eight and one-quarter million dollars annually. In addition, the city has 343 wholesale establishments with net annual sales of $133,820,000 and 3,329 retail stores with net sales each year of about $123,050,000.00.

San Antonio is now Texas' third most populous city. Its population, according to the most recent census enumeration, was 254,562, and its growth since that time is estimated to exceed, by far, the rate of increase experienced by the United States as a whole. The population of the city and its tributary territory is of American and German-American descent, with, of course, a large number of people of Mexican origin. In San Antonio proper this Mexican element numbers around 80,000.

With the restoration of normal conditions, however, the population both of San Antonio and the Southwest of which it is the mother city may be expected to grow by leaps and bounds. Despite the impressive agricultural production referred to in an earlier paragraph, San Antonio's rural hinterland is less than 10 per cent developed, and it contains hundreds of thousands of virgin acres that wait for the plows of the coming millions.

With a present that is the envy and despair of hundreds of cities of comparable size, San Antonio looks into a future that can be matched by few cities anywhere.

Book Reviews

Annals of the Pickett-Thomson Research Laboratory, Monograph XVI, Part I, Influenza. By David Thomson, O.B.E., M.D., Ch.B. (Edin.), D.P.H. (Camb.), Hon. Director, Pickett-Thomson Research Laboratory, St. Paul's Hospital, London; and Robert Thomson, M.B., Ch.B. (Edin.), Pathologist to the Pickett-Thomson Research Laboratory. 640 pages, illustrated. Baltimore, Maryland: The Williams & Wilkins Co., 1933. Paper, $12.50.

An enormous amount of material has been collected and sifted to gather the information contained in this volume. The writers have found influenza a disease of antiquity. During the past years it has been known by a great many different names. They discuss the nomenclature, history, clinical character, varieties, symptoms, diagnosis, prognosis, mortality and epidemiology.

They find that the entire world has been ravaged by influenza a great number of times during the past hundred years and that probably fifty million people have died of this disease. They say: "The diagnosis rests mostly upon its symptomatology and epidemiological features."

The greatest part of this book is concerned with the bacteriological features of this entity. Several hundred pages are devoted to the role of the Pfeiffer's bacillus. Attention is then turned to the streptococci, the pneumococci, the pneumosintes, the hemorrhagic septicemia group and the virus theory. After giving their own data they feel that the Pfeiffer bacillus is not the primary cause of influenza, but plays an important part in producing the complications of this disease. The writers are strongly inclined to accept the filterable virus theory, assigning to bacteria a symbiotic effect in producing the more dangerous complications. This is an important contribution to the study of influenza.

The Pocket Anatomy. By C. H. Fagge, M.B., M.S. (Lond.), F.R.C.S. Ninth Edition. 333 pages. Baltimore, Maryland: William Wood & Co., 1933. Cloth, $2.00.

This edition uses the terminology which has been adopted by the Anatomical Society of Great Britain and Ireland. This nomenclature differs in many instances from that of the B.N.A. Several of the sections have been revised. This compend enables the student to outline his grasp of the subject.

Human Sex Anatomy. By Robert Latou Dickinson, M.D., F.A.C.S. 145 pages, illustrated. Baltimore, Maryland: The Williams & Wilkins Company, 1933. Cloth, $10.00.

This volume is a succint and comprehensive discussion of our present knowledge of sex anatomy and its deficiencies. The writer outlines the method of collecting the material, the sources and methods of presenting as to form and scale. He tabulates the data which he presents as to whether the source material is absent, scanty, moderate or ample. The male and female organs, the anatomy of coitus and the control of conception are all treated.

The 175 plates, illustrating all the data, form the most important part of the book. This work brings one to the realization of how little actual data have been accumulated on this subject. The writer is to be commended for the pointing of the way to a more complete study of this neglected topic.

Nature, M.D. Healing Forces of Heat, Light, Water, Electricity and Exercise. By Richard Kovacs, M.D., Clinical Professor of Physical Therapy, Polyclinic Medical School and Hospital, New York. 181 pages, illustrated. Brooklyn, New York: D. Appleton-Century Company, 1934. Price, $2.00.

In these faddist times Dr. Kovacs has written a common sense book for the layman. He discusses the uses and limitations of physical medicine in a comprehensive and authoritative manner. Sufficient information is given for the average reader to draw fairly accurate conclusions as to the efficacy of the different treatments that are being offered.

Aids to Qualitative Inorganic Analysis. By R. G. Austin, B.Sc. (Lond.), A.I.C., F.R.M.S., Associate of University College, Southampton Demonstrator, St. Thomas's Hospital Medical School, Lecturer on Chemistry at Wimbledon Technical College, S.W., with an introduction by R. H. A. Plimmer, D.Sc. (Lond.), Professor of Chemistry in the University of London at St. Thomas's Hospital Medical School. 204 pages. Baltimore, Maryland: William Wood & Co., 1933. Cloth, $1.50.

This compend outlines the subject in a compact form and enables the student to systematize his knowledge in order to plan a more detailed study or prepare for an examination.

A Short Encyclopaedia for Nurses. By Evelyn C. Pearce, Sister Tutor, The Middlesex Hospital; formerly Sister Tutor, Fazakerley Hospitals and Sanatorium, Brownlow Hill Hospital, Liverpool, and the Shropshire Orthopedic Hospital. 625 pages. New York: Oxford University Press, 1934. Cloth, $3.75.

The writer has defined a number of terms in a circumlocutory manner. At other times the descriptions are not of sufficient completeness to be of more than minor value. More than the usual number of proprietary medicines are included.

Southern Medical News

The American Proctologic Society will hold its thirty-fifth annual meeting in Cleveland, Ohio, June 11 and 12, with headquarters at the Hotel Cleveland.

ALABAMA

The Montgomery County Medical Society recently honored the late Dr. Greil, a past president of the Society, by creating the Gaston J. Greil Memorial Lecture. The first lecture was delivered by Dr. Marvin F. Haygood, Superintendent of the State Tuberculosis Sanatorium at Alto, Georgia. Dr. Greil established the old Anti-Tuberculosis League in 1908.

Dr. John Russell Martin, Scottsboro, and Miss Elizabeth Ferrell were married recently.

Deaths

Dr. William Holcombe Aiken, Tuscaloosa, aged 50, died March 11 of heart disease.

Dr. George H. Harper, Monroeville, aged 59, died February 16 of emphysema.

ARKANSAS

At the annual meeting of the Arkansas State Medical Association at Little Rock in April the following officers were elected for the coming year: Dr. Melvin E. McCaskill, Little Rock, President-Elect; Dr. Albert M. Elton, Newport, Dr. Silas C. Fulmer, Little Rock, and Dr. Flem D. Smith, Blytheville, Vice-Presidents; Dr. William R. Brooksher, Jr., Fort Smith, Secretary; and Dr. Royal J. Calcote, Little Rock, Treasurer. Dr. Fergus O. Mahony, El Dorado, was installed as President.

Dr. F. Walter Carruthers, Little Rock, has moved into new offices in the Donaghey Building.

The Ashley County Medical Society has elected the following officers for the coming year: Dr. L. C. Barnes, President; and Dr. J. W. Simpson, Secretary-Treasurer; both of Hamburg.

The Chicot County Medical Society has elected the following officers for the coming year: Dr. J. H. Burge, President; and Dr. A. J. Pauli, Secretary; both of Lake Village.

The Ouachita County Medical Society has elected the following officers for the coming year: Dr. R. B. Robins, Camden, President; Dr. J. P. Clemens, Mt. Holly, Vice-President; and Dr. Sam A. Thompson, Camden, Secretary-Treasurer.

Deaths

Dr. Albert H. Gilbrech, Clarendon, aged 58, died suddenly February 27 of coronary occlusion.

Dr. John R. Piercey, Prescott, aged 57, died February 26 of diabetes mellitus.

Dr. Isaac M. George, El Dorado, aged 73, died March 3 of acute nephritis and sclerosis.

Dr. Calvin F. Heffington, Havana, aged 82, died February 27 of heart disease.

Dr. J. S. Hutcherson, Dolph, aged 80, died February 18.

Dr. William Andrew Montgomery, Atkins, aged 78, died March 2.

Dr. W. S. Norman, Hamburg, aged 82, died March 13.

DISTRICT OF COLUMBIA

The Medical Society of the District of Columbia held its annual two-day scientific assembly May 2 and 3 at the Mayflower Hotel.

The April lecture in a series of lectures to the Faculty and students of George Washington University School of Medicine was presented by Dr. Dean Lewis, Baltimore, Maryland, Professor of Surgery, Johns Hopkins University.

The Washington Heart Association held its annual meeting April 26 in the Medical Society Building.

Continued on page 18

Two useful

VITAMINE-B PRODUCTS

Tablets

The Vitamine-B Tablets

Vitamine-B was discovered in the Yale Medical School Laboratories, by DRS. T. B. OSBORNE, LAFAYETTE B. MENDEL and associates. That same year, The Harris Laboratories were founded to manufacture Yeast Vitamine-Harris Tablets.

They were the first Yeast Vitamine-B Tablets made in America and still are the only *concentrated* Yeast Vitamine-B Tablets for clinical use.

They are made from Brewers' Yeast-Harris—are palatable, convenient and contain a known amount of Vitamine-B complex (F & G). They are used wherever a concentrated Vitamine-B product is desired.

To Physicians Only Since 1919

Brewers' Yeast Powder

Brewers' Yeast-Harris

—MEDICINAL—

This is a remarkably pure culture of brewers' yeast, prepared especially for medicinal use, a dry pasteurized powder—will not ferment in the stomach; keeps indefinitely, at room temperature. Uniform in Vitamine-B content. Indicated where Vitamine-B is desired and in cases where the volume is not objectionable or whole yeast cells contraindicated.

Compatible in prescriptions.
Valuable accessory to diet.
Stimulates lactation.

Free Samples to Physicians.

THE HARRIS LABORATORIES, Inc.

TUCKAHOE TESTED HARRIS STANDARDS **NEW YORK**

Continued from page 563

DEATHS

Dr. Charles C. Ammerman, Lieutenant Commander, Medical Corps, United States Navy, an associate member of the Medical Society of the District of Columbia, died March 20.

FLORIDA

The Florida Tuberculosis and Health Association met in Jacksonville in conjunction with the Florida State Medical Association for its annual session.

Dr. F. W. Foxworthy, Miami, recently received an award of the Congressional Medal, bestowed for bravery during the Spanish-American War.

Dr. Kenneth A. Morris, Jacksonville, has moved into new offices at 237 West Duval Street.

Dr. E. C. Swift, Jacksonville, has moved his office from the Riverside Hospital to the Medical Arts Building.

The Orange County Medical Society recently gave a buffet supper in honor of Dr. Paul D. White, Harvard Medical College, Boston. Invitations to meet Dr. White and hear his address on heart disease were extended to physicians of central Florida.

Dr. and Mrs. P. J. Hudson, Crystal River, recently entertained members of the Pasco-Hernando-Citrus County Medical Society at a fish fry and oyster supper, the supper being followed by a scientific session.

Dr. Gerry R. Holden, Jacksonville, has succeeded to the Presidency of the Southeastern Surgical Congress, which will meet in Jacksonville in 1935.

DEATHS

Dr. Charles Galen Weston, Winter Park, aged 75, died March 2 of acute hemorrhagic nephritis and bronchopneumonia.

Dr. Daniel Gordon Milton, Webster, aged 62, died March 3 of angina pectoris and arteriosclerosis.

Dr. Thomas Fred Jackson, Dade City, aged 45, died March 21 of carcinoma of the leg.

Dr. Eustis Randolph Marshburn, Marianna, aged 47, died March 25.

GEORGIA

The eighty-fifth annual session of the Georgia State Medical Association was held in Augusta, May 8 to 11, at the Hotel Richmond.

The Surgical Association of the Atlanta and West Point Railroad Company, Western Railway of Alabama and Georgia Railroad held its fourteenth annual session in Augusta recently, at the Hotel Richmond.

Dr. Thomas A. Hurley, Macon, is the newly elected Commissioner of Health of Bibb County.

The Fulton County Medical Relief Association at a recent meeting elected the following officers for the coming year: Dr. C. W. Roberts, President; Dr. Edgar Boling, Vice-President; Dr. Major F. Fowler, Secretary-Treasurer; and Dr. C. W. Strickler, Chairman of the Board of Directors; all of Atlanta.

The Burke County Medical Society has elected the following officers for the coming year: Dr. J. M. Byne, Jr., Waynesboro, President; Dr. W. R. Lowe, Midville, Vice-President; and Dr. R. L. Miller, Waynesboro, Secretary-Treasurer.

The Chattooga County Medical Society has elected the following officers for the coming year: Dr. F. W. Hall, Summerville, President; Dr. W. J. Bryant, Summerville, Vice-President; and Dr. H. D. Brown, Summerville, Secretary-Treasurer.

The Decatur-Seminole Counties Medical Society has elected the following officers for the coming year: Dr. M. A. Fort, Bainbridge, President; Dr. Carl B. Welch, Attapulgus, Vice-President; and Dr. L. W. Willis, Bainbridge, Secretary-Treasurer.

The Monroe County Medical Society has elected the following officers for the coming year: Dr. W. J. Smith, Juliette, President; Dr. J. O. Elrod, Forsyth, Vice-President; and Dr. G. H. Alexander, Forsyth, Secretary-Treasurer.

The Stewart-Webster Counties Medical Society has elected the following officers for the coming year: Dr. W. C. Sims, Richland, President; and Dr. J. M. Kenyon, Richland, Secretary-Treasurer.

The Taylor County Medical Society has elected the following officers for the coming year: Dr. Lewis Beason, Butler, President; Dr. S. H. Bryan, Reynolds, Vice-President; and Dr. R. C. Montgomery, Butler, Secretary-Treasurer.

Continued on page 20

THE NEW YORK POLYCLINIC
MEDICAL SCHOOL AND HOSPITAL

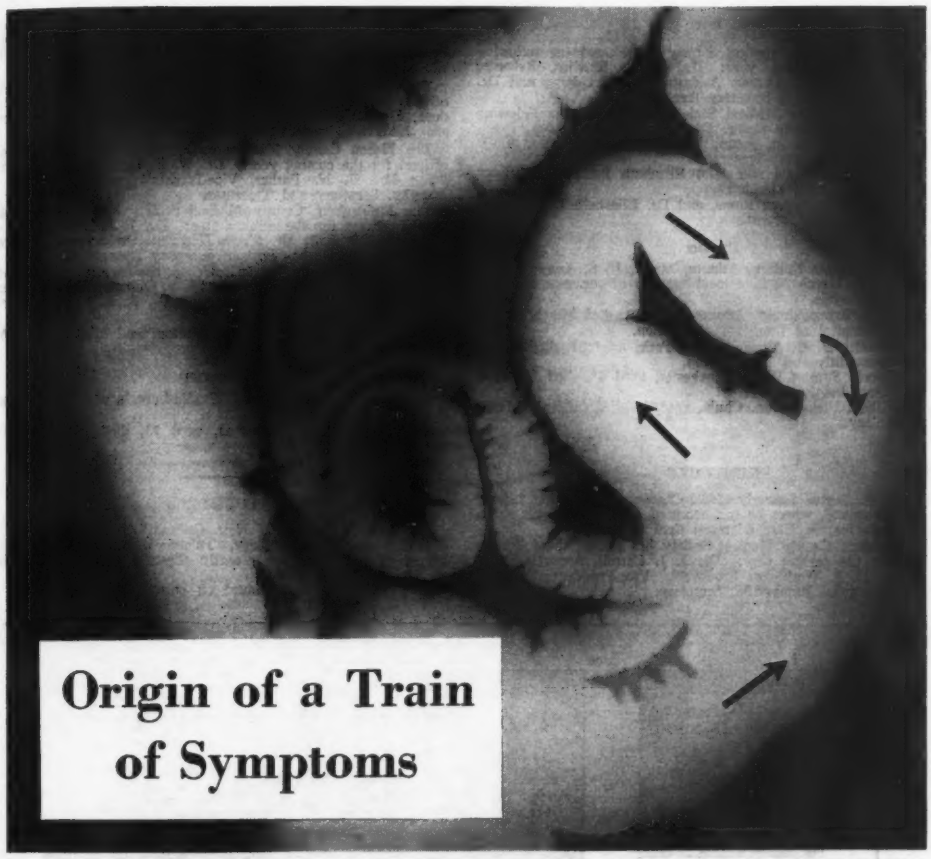
(ORGANIZED 1881)

(*The Pioneer Post-Graduate Medical Institution in America*)

EYE, EAR, NOSE and THROAT

POST-GRADUATE INSTRUCTION
comprising
MEDICINE, SURGERY and ALLIED SPECIALTIES

FOR INFORMATION ADDRESS
MEDICAL EXECUTIVE OFFICER: 345 West 50th Street, NEW YORK CITY



Origin of a Train of Symptoms

Clysma radiograph of a redundant colon.

THE redundant colon produces many symptoms which are easily and frequently misinterpreted. Its objective and subjective indications simulate those of intestinal obstruction, cholecystitis, appendicitis, or even cardiac disease.

Confirmation of a clinical diagnosis of redundant colon rests almost entirely upon an x-ray examination. So when your patient presents conflicting or indefinite symptoms, refer the case to your radiologist. His findings will reveal definitely whether or not the colon is the source of the disorders.

In gastro-intestinal disturbances, use radiographs freely. Conditions which are indefinite become clear and graphic through x-rays. Symptoms which are misleading become understandable—diagnosis becomes positive.

● *"Radiography and Clinical Photography" is free on request. Mail the coupon below.*

Radiographs Provide Diagnostic Facts

EASTMAN KODAK COMPANY, *Medical Division*,
347 State Street, Rochester, N. Y.

Gentlemen: Please send me the free publication, "Radiography and Clinical Photography," regularly.

Name _____

No. & St. _____

City & State _____

Continued from page 18

The Turner County Medical Society has elected the following officers for the coming year: Dr. R. D. Rawlins, Rebecca, President; Dr. W. J. Turner, Ashburn, Vice-President; and Dr. J. H. Baxter, Ashburn, Secretary-Treasurer.

The Wayne County Medical Society has elected the following officers for the coming year: Dr. T. G. Ritch, Jesup, President; Dr. J. T. Colvin, Jesup, Vice-President; and Dr. A. J. Gordon, Jesup, Secretary-Treasurer.

Dr. James H. Byram and Miss Elizabeth Patterson, both of Atlanta, were married March 17.

Dr. Howard W. Rogers, Rome, and Dr. Elizabeth Lydia Councilman were married recently.

Deaths

Dr. Charles Ross Bullock, Atlanta, Major, U. S. Army, retired, aged 51, died March 24 in a local hospital of coronary occlusion and arteriosclerosis.

Dr. Willis Bryant Jones, Atlanta, aged 59, died March 3 in a Baltimore hospital of intestinal obstruction.

Dr. Franklin P. H. Akers, College Park, aged 81, died March 25 of myocarditis and hypertension.

Dr. Marvin Sumter Witt, Manchester, aged 48, died March 3 in an Atlanta hospital.

Dr. William Elzie Tyson, Chula, aged 56, died suddenly March 6 of apoplexy.

KENTUCKY

Dr. M. B. Payne, formerly of St. Charles, Virginia, has located at Blue Diamond, where he has accepted a position as physician and surgeon for the Blue Diamond Coal Company.

The Bracken County Medical Society has elected the following officers for the coming year: Dr. J. J. Carroll, Augusta, President; Dr. B. F. Workman, Brooksville, Vice-President; and Dr. J. M. Stevenson, Brooksville, Secretary.

The Bourbon County Medical Society has elected the following officers for the coming year: Dr. H. M. Boxley, Millersburg, President; Dr. William Kenney, Paris, Vice-President; and Dr. W. B. Hopkins, Paris, Secretary and Treasurer.

The Lyon County Medical Society has elected the following officers for the coming year: Dr. D. J. Travis, Eddyville, President; Dr. C. P. Moseley, Vice-President; and Dr. H. H. Woodson, Eddyville, Secretary and Treasurer.

The Mason County Medical Society has elected the following officers for the coming year: Dr. W. E. Hord, Maysville, President; Dr. H. N. Parker, Vice-President; and Dr. Allen F. Murphy, Secretary and Treasurer.

The Muhlenberg County Medical Society has elected the following officers for the coming year: Dr. J. H. Harralson, Central City, President; Dr. H. D. Newman, Drakesboro, Vice-President; and Dr. G. L. Simpson, Secretary-Treasurer.

The Perry County Medical Society has elected the following officers for the coming year: Dr. J. S. Gilbert, Allais, President; Dr. D. D. Carr, Vice-President; and Dr. R. L. Collins, Hazard, Secretary and Treasurer.

Dr. Glynn Fitzgerald Bushart, Fulton, and Miss Leonora Amberg were married in March.

Deaths

Dr. Allen Morris Kincheloe, Hardinsburg, aged 86, died March 6 of cerebral hemorrhage.

Dr. A. D. Kelly, Covington, aged 73, died February 26 of acute interstitial nephritis.

LOUISIANA

Dr. Leon J. Menville, New Orleans, Assistant Professor of Medicine and Roentgenology, Tulane University of Louisiana School of Medicine, was recently presented with the Louisiana

Continued on page 22

• Drybak strappings are more practical. They discommode the patient less. Drybak is less conspicuous, because it is suntan in color. Its specially-treated backcloth repels water; hence the plaster does not loosen if the patient submerges the strapping in water while bathing. Supplied in J & J cartridge spools and hospital spools in all standard widths, and in rolls, 5 yds. x 12", uncut.

COSTS NO MORE THAN REGULAR ADHESIVE PLASTER

ORDER FROM YOUR DEALER

Johnson & Johnson
NEW BRUNSWICK, N. J. CHICAGO, ILL.

Professional Service Department

Free washing with

DRYBAK

THE WATERPROOF ADHESIVE PLASTER

Second-Hand Prescriptions Exchanged Here

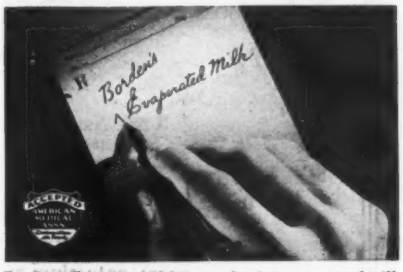
IF Mr. Culbertson could eavesdrop during a session of the Homeville Heights Bridge Club—well, he might be mildly shocked at some points in the play...

But, Doctor—his feelings would be nothing to yours if *you* could listen in—and hear the light-hearted way those ladies toss medical advice about!

And when the talk turns to infant feeding—how they love to trade their pet prescriptions! For some strange reason, almost everybody enjoys meddling with the feeding instructions a young mother gets from her physician.

A baby's best defense against these well-meaning meddlers is—his doctor's explicit formula. And if that formula calls for evaporated milk, it's well worth while, for safety's sake, to specify the brand. You know that only certain brands of evaporated milk measure up to your high standards—and that Borden's *always* does. Every step in its preparation—from the selection of the raw milk through the final sterilization—is rigidly supervised under skilled laboratory control.

May we send you a simple, compact infant-feeding formulary, and other strictly professional material which we believe you will also find interesting and valuable? Address The Borden Company, Department SN634, 350 Madison Avenue, New York City.



Borden's Evaporated Milk was the first evaporated milk for infant feeding to be submitted to the American Medical Association Committee on Foods, and the first to receive the seal of acceptance. No formulas are given to the laity.

Continued from page 20

Academy of Sciences' medal for his paper, "The Possible Application of a Visualized Lymphatic System to the Cancer Problem," the medal being an annual award made by the Academy at their meeting in March.

Col. Charles F. Craig, New Orleans, M.C., retired, was the guest of honor at a dinner for the Reserve Officers of the Medical Corps given during the Oklahoma State Medical meeting at Tulsa in May.

Dr. Charles E. Verdier, New Orleans, and Miss Wanda Iles were married in March.

DEATHS

Dr. J. George Dempsey, New Orleans, aged 61, died February 4 of arteriosclerosis.

Dr. Edward Philip McCormac, New Orleans, aged 37, died suddenly March 3.

Dr. Julius J. Stagg, Eunice, aged 58, died February 19 of cerebral hemorrhage.

MARYLAND

Dr. Alan C. Woods, Baltimore, has been appointed to succeed Dr. William H. Wilmer, who will retire July 1, as Acting Director of the Wilmer Ophthalmological Institute at Johns Hopkins University School of Medicine, Baltimore. Dr. Woods also will become Professor of Ophthalmology.

The Thayer Memorial Wards in the Hurd Memorial Hall of Johns Hopkins Hospital, Baltimore, were officially opened in February with addresses and exercises honoring the memory of Dr. William Sydney Thayer, deceased.

Dr. Dean Lewis, Baltimore, Professor of Surgery at the Johns Hopkins Medical School, was the guest speaker recently at a meeting of the University of Virginia Medical Society. Dr. Lewis also delivered an address recently to a group of the faculty and students of George Washington University School of Medicine, Washington, District of Columbia.

Dr. Adolph H. Schultz, Baltimore, Associate Professor of Physical Anthropology at the Johns Hopkins University School of Medicine, was the guest speaker before a meeting of the Duke Chapter of Sigma Xi, Durham, North Carolina.

Dr. Dudley Cyrus Babb, Baltimore, and Miss Margaretta Laurenson Lackey were married April 2.

Dr. John W. Parsons and Miss Isabella G. Hunner, both of Baltimore, were married March 17.

DEATHS

Dr. William Henry Welch, Baltimore, aged 84, died April 30.

MISSISSIPPI

Dr. Adrian Van Dyke Hagaman and Miss Sue Griffith, both of Jackson, were married in February.

DEATHS

Dr. John Gill Lilly, Tupelo, aged 61, died March 1 of heart disease.

MISSOURI

The third annual meeting of the Harvey Cushing Society was held in St. Louis April 5 and 6 with operative clinic, roentgenological demonstration and addresses making up the program. The Society is composed of physicians and surgeons of North America specializing in diseases and lesions of the brain, the spinal cord and allied anatomy.

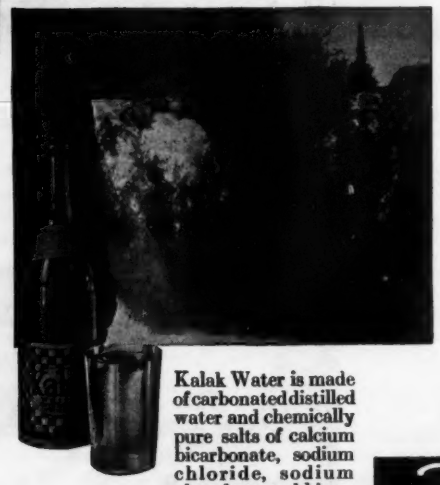
Dr. Herluf G. Lund, St. Louis, was honored recently by the Staff of the Lutheran Hospital with a buffet supper and the gift of a gold watch in recognition of twenty years' continuous service by Dr. Lund as Chairman of the Staff.

Dr. Edward H. Skinner, Kansas City, has been named to succeed Dr. George E. Bellows, resigned, as Chairman of the Public Health and Welfare Committee of the Chamber of Com-

Continued on page 24

A Pure, Palatable, Carbonated

PREPARED WATER



THERE are many conditions, no doubt, where you will want your patient to increase his daily intake of water.

In such cases, why not suggest the use of Kalak Water, the palatable, carbonated alkaline water prescribed by physicians for over twenty years.

Kalak Water is made of carbonated distilled water and chemically pure salts of calcium bicarbonate, sodium chloride, sodium phosphate and bicarbonates of magnesium, potassium and sodium.

Kalak

Mellin's Food — *Milk Modifier*

Produced by an infusion of Wheat Flour, Wheat Bran and Malted Barley admixed with Potassium Bicarbonate—consisting essentially of Maltose, Dextrins, Proteins and Mineral Salts.

Maltose and Dextrins

Mellin's Food furnishes carbohydrates which are always needed to make up the deficiency of sugar in cow's milk. These carbohydrates are maltose and dextrins in proportion of three parts maltose to one part dextrins. Maltose, the predominating carbohydrate, has a high point of assimilation and may be given in liberal amounts without danger of nutritional disturbance.

Protein

Mellin's Food assists in meeting the protein needs, for Mellin's Food contains cereal protein derived from wheat flour, malted barley and wheat bran. (*"The proteins of wheat bran are characterized by their high content of the so called nutritionally essential amino acids."*) J. Biol. Chem., 69, 98, (1926).

Mineral Salts

Mellin's Food adds mineral matter consisting of phosphorus, magnesium, sodium, iron, copper and manganese derived from wheat flour, wheat bran and malted barley, with the addition of potassium bicarbonate.

[**Samples and literature sent to physicians upon request.**]

Mellin's Food Company - - Boston, Mass.

Directions for using Mellin's Food are left entirely to the physician.

Continued from page 22

merce of Kansas City. Dr. Bellows has held this office for twelve years.

Dr. John D. Hayward, St. Louis, was recently presented with a silver loving cup by the St. Louis County Medical Society in recognition of his services as President of the Society in 1933.

Dr. Robert T. Gibbs, Mexico, has recently completed fifty years in the practice of medicine.

Dr. William O. Hawkins, Roanoke, has completed his fiftieth year in the practice of medicine.

DEATHS

Dr. Walter P. Mattox, Sullivan, aged 63, died March 22 of cerebral hemorrhage.

Dr. Ross Hopkins, Jefferson City, aged 55, died March 27 of muscular atrophy.

Dr. Frank Baker Hiller, Kansas City, aged 64, died March 18 of heart disease.

Dr. Horace Rinaldo Minnick, Bellflower, aged 80, died February 14.

Dr. John Sabert Mott, Kansas City, aged 89, died January 7 of acute dilatation of the heart.

Dr. Jesse Fred Bond, St. Louis, aged 53, died March 14 of gastric ulcer.

Dr. William Dennis Colby, Kansas City, aged 72, died January 16 of cardiac hypertrophy.

Dr. Neal McLain Draper, St. Louis, aged 58, died March 5 of mitral insufficiency.

Dr. Charles Lucien Kreeger, Kansas City, aged 63, died January 8 of angina pectoris.

Dr. Charles D. Potts, St. Louis, aged 63, died February 19 of heart disease.

Dr. W. H. Black, Kansas City, died February 28.

Dr. Robert M. Smith, Kansas City, aged 72, died March 18.

NORTH CAROLINA

The Tri-State Hospital Conference of the North and South Carolina and Virginia Hospital Associations held a meeting in Charlotte in April.

Dr. A. R. Shands, Jr., Durham, Professor of Orthopedic Surgery at Duke University, recently gave an address at a meeting of the University of Virginia Medical Society.

Dr. Everett Walker McCauley, Burlington, and Miss Ella Irene Wilson were married in February.

Dr. William LeRoy Fleming, Enfield, and Miss Edith Mickey Duke were married in March.

DEATHS

Dr. Albert D. Edwards, Walkertown, aged 56, died February 15 of pneumonia.

Dr. Leonard Oscar Hayes, Fremont, aged 62, died January 26.

Dr. George Norfleet Harrell, Grimsland, aged 52, died suddenly February 16 of cerebral hemorrhage.

Dr. Geo. Wm. Lewis, Wilson, aged 70, died February 16 of arteriosclerosis.

Dr. Michael Joseph Costello, Asheville, aged 68, died March 21 of carcinoma and intestinal obstruction.

Dr. Hanson Slaven Ogilvie, Asheville, aged 50, died March 22 of heart disease.

Dr. R. D. Tucker, Powhatan Courthouse, aged 70, died March 13 of heart disease.

Dr. H. D. Stewart, Monroe, aged 62, died March 20.

OKLAHOMA

The Oklahoma State Medical Association held its forty-second annual meeting in Tulsa in May.

The Oklahoma Pediatric Society met in Tulsa May 21 for a clinical conference, with Dr. C. E. Bradley, Tulsa, in charge of the program.

Dr. Charles E. White, Muskogee, has been appointed to succeed Dr. Edwin H. Coachman, resigned, as Health Commissioner of Muskogee County.

Dr. Charles M. Pearce, McAlester, has entered into private practice after resigning as Health Commissioner of Pittsburg County.

The Muskogee Academy of Medicine was organized in February for the purpose of promoting scientific medicine in the territory of Muskogee. The first scientific program was held in April.

Continued on page 26

An Advance in Opiate Medication

Dilaudid

dihydromorphinone hydrochloride

Council Accepted

Dilaudid possesses several advantages over morphine for the control of pain and cough. It acts quicker, and causes fewer undesirable symptoms. A dose of 1/20 gr. Dilaudid will usually replace ¼ gr. morphine.

Hypodermic tablets, 1/32 and 1/20 grain.
Oral tablets, rectal suppositories, 1/24 grain.
Ampules, 1/32 grain. Powder, readily soluble.

Further information upon request. Send your Federal narcotic order for a trial tube of 20 hypodermic tablets 1/20 gr. each.

BILHUBER-KNOLL CORP., 154 Ogden Avenue, Jersey City, N. J.

WHEN you prescribe S.M.A. for a normal infant deprived of breast milk you do so with the assurance that the chances are 10 to 1 that the child will do unusually well on it.

S.M.A. produces *excellent* nutritional results in most cases, and produces these results more simply and more quickly; and there is a wealth of clinical evidence to back that claim.

Physicians Report Results

As one example of this, take the following answers to a questionnaire sent to a representative group of physicians early in our work:

Q.—Have the average results obtained by you in feeding S.M.A. been excellent, good, fair or poor?

A.—Excellent, 74.2%
Good, 25.8%
Fair, 0%
Poor, 0%

Q.—Do you feel that S.M.A. is of value to you in your practice from the standpoint of preventing nutritional diseases?

A.—Yes, 97.1%
Undecided, 2.9%

Q.—Has the feeding with S.M.A. been easier and less annoying than with other foods or mixtures used by you heretofore?

A.—Yes, 100%

Q.—Have your nutritional results been better than with other foods or mixtures used by you heretofore?

A.—Yes, 83%
No, 14.6%
Undecided, 2.4%

If you are interested in saving yourself exacting detail in infant feeding, and want to be assured of excellent results in most cases, you can do no better than prescribe S.M.A., the formula prepared with laboratory exactness for infants deprived of breast milk.

S.M.A. Ahead in 1915; Still Far Ahead

S.M.A. has been antirachitic from its beginning in 1915. S. M. A. was a revolutionary departure then, was far ahead in 1921 when it was offered to the profession generally, and is still far ahead in numerous unheralded ways, some of which are:

1. Buffer value is practically identical with breast milk.
2. Fat has the same Reichert - Meissl number, Iodine number, Polenske number, Saponification number, melting point and refractive index as breast milk fat.
3. The pH is the same as breast milk.
4. Electrical conductivity is the same as breast milk.
5. Freezing point is the same as breast milk.
6. Osmotic pressure is the same as breast milk.
7. Curds produced by the action of the gastric juices on S.M.A. are soft and practically the same as breast milk.
8. Stools are acid and also physically similar to those of breast fed infants.

S. M. A. is the Antirachitic Breast Milk Adaptation

S.M.A. is a food for infants—derived from tuberculin tested cows' milk, the fat of which is replaced by animal and vegetable fats including biologically tested cod liver oil; with the addition of milk sugar potassium chloride and salts; altogether forming an antirachitic food. When diluted according to directions, it is essentially similar to human milk in percentages of protein, fat, carbohydrates and ash, in chemical constants of the fat and in physical properties.

ACCEPTED AMERICAN MEDICAL ASSN.

Try S.M.A. in your own practice. For samples simply attach this paragraph to your letterhead. S. M. A. Corporation, 4614 Prospect Ave., Cleveland, O.

12-64

S.M.A. PRODUCES RESULTS, MORE SIMPLY AND MORE QUICKLY

© 1933, S.M.A. Corporation, Cleveland, Ohio

From the
YOUNGEST
to the
OLDEST

Horlick's, the Original Malted Milk, offers a nutritious, easily digested diet.

Some of Its Special Uses:

1. In infant feeding
2. For the growing child
3. In malnutrition
4. In weakened digestion
5. For sleeplessness
6. For the sick
7. In convalescence
8. As a light luncheon for all ages.

HORLICK'S - - Racine, Wis.

Trademark Registered **STORM** Trademark Registered

Binder and Abdominal Supporter

This Photo Shows Type "N"

Gives perfect uplift and is worn with comfort. Made of Cotton, Linen or Silk, washable as underwear.

Three distinct types of Storm Supporters — many variations of each type.

STORM supporters are made for all conditions needing abdominal uplift. Ptosis, Hernia, Pregnancy, Obesity, Relaxed Sacro-Iliac, Articulations, Kidney Conditions, Post-Operative Support, etc.

Each Belt Made to Order **Ask for Literature**

KATHERINE L. STORM, M.D.
Originator, Owner and Maker
1701 Diamond St. **Philadelphia**

Continued from page 24

Dr. L. J. Moorman, Oklahoma City, Dean of the University School of Medicine, was on the program of a meeting of the University Chapter of the American Association of University Professors in Norman recently.

Dr. and Mrs. Fred H. Clark have returned to El Reno, where Dr. Clark will practice after residing in Aspinwall, Pennsylvania.

Dr. W. D. Oliver, formerly of Erick, has moved to Mangum, where he will continue to practice medicine.

The Southern Oklahoma Medical Association held a meeting in Ada in March.

Dr. G. E. Stanbro, Oklahoma City, has been made a member of the Surgical Staff of the Oklahoma City Clinic.

Dr. A. K. Cox, Watonga, has been appointed to succeed Dr. T. A. Hill as County Health Officer.

Dr. H. R. Shannon, Enid, has been appointed to succeed Dr. D. D. Roberts, resigned, as County Physician.

Dr. L. P. Smith, formerly of Elmore City, has moved to Marlow, where he will continue to practice medicine.

DEATHS

Dr. William Daniel Atkins, Holdenville, aged 59, died March 15 of cerebral hemorrhage.

Dr. M. P. Willis, Commerce, aged 64, died February 1.

Dr. Howard Bankes Ames, Alva, aged 60, died March 14.

Dr. C. A. McClelland, Keyes, aged 58, died January 26.

SOUTH CAROLINA

The South Carolina State Medical Association held its eighty-sixth annual session in Charleston in May.

Dr. Julian P. Price, Florence, is the newly elected President of the South Carolina Pediatric Society.

Dr. A. Wells Lowman, formerly of Stonega, Virginia, has located at Denmark for the practice of medicine.

Dr. Harry Ernest Heinitsh, Jr., Spartanburg, and Mrs. Annette Blake Franklin were married April 17.

Dr. Roy Lee Cashwell, Fountain Inn, and Miss Mary Sullivan West were married in March.

TENNESSEE

At the meeting of the Southeastern Surgical Congress in Nashville recently Dr. William D. Haggard, Nashville, was elected President-Elect for the coming year and Dr. B. T. Beasley, Atlanta, Georgia, was reelected Secretary. Dr. Gerry R. Holden, Jacksonville, Florida, is the incoming President.

The Middle Tennessee Medical Association held its seventy-ninth semi-annual meeting at Springfield May 10 and 11.

The annual Alpha Omega Alpha Lecture was delivered in the amphitheater of the Vanderbilt School of Medicine in April by Dr. Samuel C. Harvey, Professor of Surgery at the Yale University School of Medicine.

Dr. John Lee Montgomery, Erwin, and Miss Mayme Agnes Tucker were married in February.

Dr. Charles Barton Etter and Miss Frances Durham, both of Memphis, were married in March.

DEATHS

Dr. Ernest White Patton, Chattanooga, aged 52, died March 15 of heart disease.

Dr. William Gibson Black, Nashville, aged 76, died March 26 of thrombosis.

TEXAS

The Texas State Medical Association held its annual meeting in San Antonio May 14-17, the dates of the meeting having been made a week later than originally set.

The Hays County Medical Society was recently reorganized to embrace also Blanco County, the new society to be known as the Hays-Blanco Counties Medical Society. Officers elected for the coming year are Dr. E. P. Shelton, Dripping Springs, President; Dr. Charles T. Brown, San Marcos, Vice-President; and Dr. J. R. DeSteigner, San Marcos, Secretary-Treasurer.

The Milam County Medical Society has elected the following officers for the coming year: Dr. Edward S. Rischar, reelected President; Dr. A. S. Epperson, Vice-President; and Dr. G. B. Taylor, reelected Secretary-Treasurer; all of Cameron.

The Williamson County Medical Society recently reorganized

Continued on page 28

Klim message of the month

Your Own Klim Formula *not* A Proprietary Infant Food

When using proprietary infant foods "it is impossible to modify them to fit the needs of the individual infant."* In other words, when proprietary infant foods are used, or as in some cases, prescribed, "accurate diagnosis and the indication for individual treatment of one of the most complex and fateful problems in medicine" is left to the mother "and the directions on a tin can or a glass bottle."* When prescribing Klim Powdered Whole Milk, individual babies with their specific nutritional needs can be fed both scientifically and adequately.

*Morse, J. L., Clinical Pediat., p. 184

*Brennemann, J., Abt. Pediat., p. 718

AUTHORITY: "It would seem, offhand, as if an artificial food which contained the same food elements in the same relative proportions that they are in human milk would be a perfect food and answer as well as human milk. Experience has shown, however, that, while some babies will thrive on a food of this composition, it is not suitable for all babies or for all ages. While babies thrive throughout the nursing period on human milk of uniform strength, they cannot take a food as strong as this in the early weeks and months and need a stronger food in the later months. Furthermore, no artificial food, although it may contain the same proportions and amounts of the different food elements, is the same as human milk. It is impossible to make an artificial food which is identical with human milk . . ." (Morse, J. L.—*Clinical Pediatrics*—[1926] p. 147-8).

PRESCRIBE

SAFE, PURE, WHOLE MILK IN POWDERED FORM . . .

NRA WE DO OUR PART

KLIM

ACCEPTED AMERICAN MEDICAL ASSN.

Literature and samples, including infant feeding calculator, will be sent on request

THE BORDEN COMPANY, Dept. KM167, 350 MADISON AVENUE, NEW YORK, N. Y.

OXYGEN

and Equipment for its Administration

With Oxygen being used preoperatively, postoperatively, in pneumonias, in cardiac cases, etc., it is essential that every physician be familiar with the best in equipment for its administration.

We offer you—for sale or rental—leading makes of Oxygen Tents, Nasal Catheter Apparatus, Bedside Inhaling Outfits, as well as equipment for the treatment of Angina Pectoris by inhalation of Carbon Dioxid.

Write for Circulars

1. **The Real Story of Oxygen for the Medical Profession.**
2. **Oxygen as a Therapeutic Agent.**
3. **Descriptive Matter on Oxygen Tents.**
4. **Why Use Gases as Anesthetics and Resuscitants?**
5. **What You Get for Your Dollar When You Purchase Medical Gases.**
   Etc., Etc.

Puritan Compressed Gas Corp.

Manufacturers of

OXYGEN—NITROUS OXID—ETHYLENE—CARBON DIOXID—PERCENTAGE MIXTURES

Offices in Most Principal Cities

Continued from page 26

to embrace also Burnet and Llano Counties, the new society to be known as the Williamson-Burnet-Llano Counties Medical Society. It was voted to let officers already chosen for the Williamson County Society serve the new organization for the coming year, as follows: Dr. G. D. Ross, Liberty Hill, President; Dr. A. J. Rice, Florence, Vice-President; and Dr. Van C. Tipton, Georgetown, Secretary-Treasurer.

Dr. R E. Beddoe, formerly of Belton, has gone to Wuchow, China.

Dr. S. H. Bergman has moved from New Willard to Livingston.

Dr. G. D. Boyd, Jr., has moved from San Antonio to Baytown.

Dr. W. J. Graber, Jr., has moved from Temple to Lake Charles, Louisiana.

Dr. Lindsey Smith has moved from Dallas to Streetman.

Dr. Robert Nelson Smith, formerly of Comanche, has moved to Silver City, New Mexico.

Dr. S. B. Slaughter has moved from Crockett to Bryan.

Dr. J. W. Tottenham, Jr., has moved from Keller to Fort Worth.

Dr. J. R. Turner has moved from Amherst to Brownfield.

Dr. C. C. Burns has moved from Henderson to Hot Springs.

Dr. D. W. Clark has moved from Farwell to Vega.

Dr. J. C. Gardner has moved from Evant to Levelland.

Dr. D. A. Harrison, Jr., has moved from San Antonio to Kingsville.

Dr. David D. Kram, formerly of San Benito, has moved to Chicago, Illinois.

Dr. Harold Lindley has moved from Vernon to Colorado.

Dr. John Alfred Martin has moved from Fort Stockton to McCamey.

Dr. John C. Montgomery, formerly of Dallas, has moved to Fort Sill, Oklahoma.

Dr. N. T. Mulloy has moved from Gatesville to Turnersville.

Dr. S. P. Sellers has moved from Honey Grove to Ladonia.

Dr. Evans P. Stewart has moved from Stratford to Tulia.

Continued on page 30

THELESTRIN

OVARIAN FOLLICULAR HORMONE

A standardized preparation of the ovarian follicular hormone for intensive ovarian therapy by hypodermic injection.

Indicated in the treatment of scanty menstrual flow, amenorrhea and the vasomotor and nervous symptoms of the menopause.

Each ampoule contains 25 rat units standardized by the Allen-Doisy method.

Boxes of 6 1-cc. ampoules

• G. W. CARNRICK CO. •

20 Mt. Pleasant Ave. Newark, N. J.

WHEN THE THERMOMETER *Soars*

WATCH THE INFANT'S REACTION TO FATS

There can be no success in the treatment of summer-complaint without close attention to the food.

DIARRHEAL BABIES die from starvation and thirst due to water loss. They cannot stand prolonged starvation. Authorities generally agree that it is not necessary to wait for the stools to become normal before giving food. DRYCO normally meets the need for nourishment when the baby's stomach rebels against other foods.

Clinicians have found that DRYCO is well tolerated when other foods with higher fat and lower protein content often fail. Let DRYCO help solve routine feeding and feeding problems in difficult diarrheal cases. Send for case reports on diarrhea and vomiting.

PRESCRIBE

DRYCO

Made from superior quality milk from which part of the butterfat has been removed, irradiated by the ultra-violet ray, under license by the Wisconsin Alumni Research Foundation (U. S. Pat. No. 1,680,818) and then dried by the "Just" Roller Process.

THE DRY MILK COMPANY, INC.

Dept. SM 350 Madison Avenue, New York, N. Y.

Continued from page 28

Dr. Sidney E. Stout, Fort Worth, and Miss Helene Earldine Robb were married in February.

DEATHS

Dr. William E. Herrin, Dallas, aged 60, died March 7 of carcinoma of the base of the tongue.

Dr. Keeton Alexander, Lockhart, aged 52, died March 8 of uremia.

Dr. Carmotte Ashley Cobb, Beaumont, aged 57, died February 25 of myocarditis.

Dr. W. A. Hawkins, Dallas, aged 50, died November 15.

Dr. Thomas Hugh G. Cook, Weslaco, aged 68, died February 18 of chronic endocarditis.

Dr. George Lucene Langworthy, Tyler, aged 55, died March 31 of cardiorenal disease.

Dr. Edward Cole Clavin, San Antonio, died March 3.

Dr. Jonas Lester Johnson, Eastland, aged 64, died January 17 of peritonitis following perforation of the urinary bladder.

The Ella Oliver Home

A private maternity home for the care and protection of unfortunate girls during pregnancy and confinement.

Under auspices of Women's Christian Association of this city.

Staff physician in daily attendance or may have any other ethical physician. Modern hospital equipment, graduate nurse. Rates very reasonable. Adoption or board arranged for babies.

Strictest privacy is maintained, correspondence confidential.

For information, address

Ella Oliver Home, 903 Walker Avenue, Memphis, Tenn., Phone 3-0639

The "MESCO" Laboratories manufacture the largest line of Ointments in the world. Sixty different kinds. We are originators of the Professional Package. Specify "MESCO" when prescribing ointments. Send for lists.

Manhattan Eye Salve Co.

LOUISVILLE, KENTUCKY

Classified Advertisements

ASSISTANCE OFFERED TO MEDICAL WRITERS. Research. Abstracts. Translations (all languages). Papers prepared from author's data. Ten years' experience with leading physicians and appointments on medical journals of highest standing. I employ no assistants; all my work is done personally and is reliable. Florence Annan Carpenter, 413 St. James Place, Chicago, Ill.

DRUG ADDICTION (30 years' experience)—THE STOKES HOSPITAL, 923 Cherokee Road, Louisville, Kentucky. Phone East 1488. Treatment one of gradual reduction. Diarrhea, muscular spasm and withdrawal pains absent. Non-injurious, non-dangerous, absolutely safe. Patient's identity protected. Privacy assured. Rates and folder on request.

Dr. Louis G. Wille, New Braunfels, aged 70, died February 4 following a paralytic stroke.

Dr. John R. Elliott, Palacios, aged 60, died February 10.

Dr. Edwin B. Ellis, Streetman, aged 62, died January 19 from injuries received in an automobile accident.

Dr. B. J. Norwierski, Yorktown, aged 70, died February 19.

VIRGINIA

The Richmond Academy of Medicine has recently organized a Section on the History of Medicine, and elected the following officers: Dr. J. K. Hall, President; Dr. Beverley R. Tucker, Vice-President; and Dr. John Powell Williams, Secretary-Treasurer; all of Richmond.

The University of Virginia Hospital held its thirteenth regular spring postgraduate clinic May 17 and 18.

The Norfolk County Medical Society held its annual all-day clinic in April, with a large attendance and an interesting and instructive program.

Dr. W. H. Hale, formerly of Bland, where he operated a clinic, has removed to Pearisburg to practice.

Dr. W. Ambrose McGee, Richmond, is the newly elected President of the Alpha Alumni Chapter of the Pi Kappa Alpha national fraternity recently reorganized in his city.

Dr. H. Cowles Rucker, Mattaox, is the newly elected President of the Amelia Golf Club.

Dr. Henry E. Davis, Williamsburg, has been appointed to succeed Dr. W. L. L. Smoot, resigned, as a member of the School Board of that city.

Dr. James W. Reed, Norfolk, has been elected a member of the City Council, succeeding Mr. S. L. Slover, resigned.

Dr. M. B. Payne, formerly of St. Charles, has moved to Blue Diamond, Kentucky.

Dr. Charles F. Kincheloe has located at East Falls Church to practice.

Dr. M. F. Brock is now Superintendent of the Norfolk Welfare Center and is Physician-in-Charge of the Grandy Sanatorium, a unit of the Center.

Dr. Knowlton T. Redfield, Roanoke, Superintendent of Jefferson Hospital, has accepted an appointment as Superintendent of the Protestant Hospital, Norfolk, to succeed Dr. James Culpepper, deceased.

The Virginia Society of Otolaryngology and Ophthalmology held its annual meeting at Lynchburg in May.

Dr. A. Wells Lowman, formerly of Stonega, has moved to Denmark, South Carolina.

Dr. Thomas Hunnicutt has opened offices in the Medical Arts Building, Newport News, for general practice.

Dr. Frederick P. Fletcher, Richmond, is the newly elected President of the East End Business Men's Association.

Dr. J. W. Reed, Norfolk, has been elected to the City Council.

Dr. Charles A. Young, Roanoke, left in May to attend clinics in Spain, Italy, Switzerland and Germany.

Dr. James Asa Shield and Miss Frances Richardson, both of Richmond, were married April 14.

Dr. Herman Stuart Fletcher and Miss Helen Louise Overmann, both of Richmond, were married April 4.

Dr. Fred T. Hauser, Bland, and Miss Juanita Shannon were married recently.

Dr. Wyatt Earle Roy, Richmond, and Miss Anne Estelle Taylor were married in March.

Dr. Allen W. Lane, Blackstone, and Miss Frances Barrow were married April 7.

DEATHS

Dr. Calvin Hawthorne Childress, Norfolk, aged 42, died suddenly April 1 of angina pectoris.

Dr. James T. Jarrett, Roanoke, aged 63, died April 1.

Dr. Charles Lee Quaintance, formerly of Charlottesville, aged 39, died April 13 in New York City.

WEST VIRGINIA

The West Virginia State Medical Association held its annual meeting at Huntington in May at the Hotel Pritchard.

Dr. Paul L. Dent has located at Point Pleasant, where he has opened offices for general practice.

DEATHS

Dr. Olin H. Jennings, Williamson, aged 46, died March 24 following a heart attack.

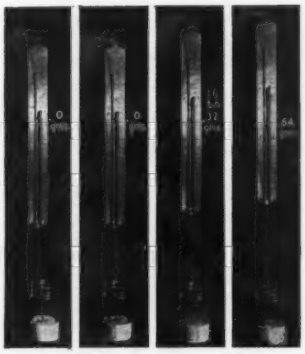
Dr. Ottis Dee McCoy, Wheeling, aged 56, died March 13 of pneumonia.

CURD TENSION

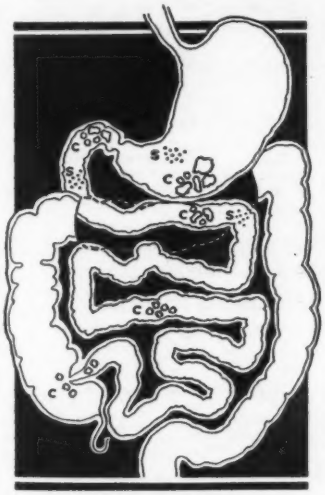
- AND INFANT FEEDING -

ITS · EFFECT · UPON · THE · ASSIMILATION · OF

CARBOHYDRATES



BREAST MILK SIMILAC POWDERED MILK COW'S MILK



C—Cow's milk S—Similac
Schematic drawing of the relative size of the curds of cow's milk and Similac vomited by six weeks old puppies after one-half hour's ingestion.

THE curds of milk contain only a small amount of carbohydrates, sufficient, however, to be a disturbing factor in infant feeding.

"A large part of the digestion and absorption of the carbohydrates takes place in the upper part of the small intestines."[1]

"The disaccharides, maltose, sucrose and lactose, are converted into monosaccharides through the action of enzymes secreted by the small intestine and are absorbed in the form of monosaccharides.

"When absorption is impaired, some sugar may reach the large intestine and here be attacked by the bacteria present. Sugar itself rarely appears in the stool, it being decomposed to form acids and gases."[2]

The large, tough curds of cow's milk are more slowly disintegrated and thus more slowly release the encased carbohydrates than the soft, flocculent curds of SIMILAC.

The disintegration of the curd of cow's milk may not be completed until after the curd, with the encased carbohydrate, has passed that portion of the small intestine where the enzymes for the conversion of disaccharides into monosaccharides are present. There is not this possibility when SIMILAC is fed because the fineness of the curd of SIMILAC does not permit of the encasement of carbohydrates to any extent.

The finer the curd the greater the surface area. The greater the surface area the more exposed are the fats, carbohydrates, proteins and salts to the digestive enzymes. Result . . . a more complete utilization of the food elements.

[1] London & Polowzowa: Zeitschr. f. physiol. Chem. 1906, XLIX, 328.
[2] Marriott: Infant Nutrition, pg. 81.

Samples and literature will be sent on receipt of your prescription blank.

SIMILAC—Made from fresh skim milk (casein modified); with added lactose, salts, milk fat and vegetable and cod liver oils.

M & R
DIETETIC LABORATORIES, INC.
COLUMBUS, OHIO.

If this tired, worried, over-worked mother were using Pablum for her babies' cereal feedings, she could have slept that extra much-needed hour instead of losing her temper while her children clamor for breakfast. For she can prepare Pablum in an instant, directly in the cereal bowl, simply by adding water or milk of any temperature—salt, cream and sugar for the older child and herself.

GETTING up an hour earlier in the morning is an inconvenience for most persons, but for the mother of young babies it is a hardship, sometimes almost tragic, frequently nullifying the best-planned pediatric advice.

This is especially true in the case of the nursing mother whose supply and quality of breast milk are affected by emotional shocks resulting often in agalactia and sometimes giving rise in the baby to diarrhea, colic, and even convulsions. Furthermore, the mother's emotional stress brings about a train of behavior on her part which is reflected in the child's psychologic reactions so that a vicious circle of bad habit formation is set up.

From this angle, the recent introduction of the pre-cooked form of Mead's Cereal, known as Pablum, assumes new importance in the doctor's psychological handling of both mother and child, quite aside from its nutritional value.*

Because Pablum can be prepared in a minute, the mother can sleep the extra hour she would otherwise be compelled to spend in a hot kitchen cooking cereal. Added rest means better poise, so that petty annoyances do not bring jaded nerves. Prompt feedings prevent many childhood tantrums, and a satisfied baby usually eats better and enjoys better digestion and growth.

*Like Mead's Cereal, Pablum represents a great advance among cereals in that it is richer in a wider variety of minerals (chiefly calcium, phosphorus, iron, and copper), contains vitamins A, B, E, and G, is base-forming and is non-irritating. Added to these special features, it is adequate in protein, fat, carbohydrates, and calories. Pablum consists of wheatmeal, oatmeal, cornmeal, wheat embryo, yeast, alfalfa leaf, and beef bone.

MEAD JOHNSON & COMPANY, Evansville, Indiana, U.S.A.

Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons.

ild,

ute,
uld
hen
ise,
ded
ild-
eats
rth.

nce
y of
er),
d is
t is
ies.
eat

A.

for sick as well as normal babies
Dextri-Maltose, Carbohydrate of Choice

In gastrointestinal disorders, "Dextri-maltose has been preferred to the other sugars as apparently less irritating."—*E. Cassie and U. Cox: The examination of the gastric contents in infants, with some considerations as to the value of lactic acid milk in infant feeding, Lancet, 2:322-325, August 14, 1926.*

"As to the kind of extra carbohydrate to be added, whether lactose or maltose, I believe dextri-maltose to be better in general in cases of fat indigestion (infantile atrophy)."—*C. H. Dunn: The Hygienic and Medical Treatment of Children, Southworth Co., Troy, New York, 1917, V. 1, p. 418.*

In the treatment of decomposition, "The period of repair may be shortened by giving suitable additional food; the best, probably, being buttermilk to which carefully regulated proportions of dextrin and maltose preparations or malt soup are added."—*E. Feer: Text-Book of Pediatrics, J. B. Lippincott Co., Phila., 1922, p. 284.*

In infantile atrophy, "The carbohydrate should be increased by gradual addition of dextrimaltose.

"Malt soup or dextrimaltose (Mead's) should be added in teaspoonful or more doses to each feeding until the point of carbohydrate tolerance is reached."—*L. Fischer: Diseases of Infancy and Childhood, F. A. Davis Co., Phila., 1925, V. 1, p. 285.*

In the case of a premature infant, "Dried milk with water was given, which later was changed to whole milk, 14 ounces; water, seven ounces, and dextri-maltose No. 1, one and one-half ounces. Seven feedings of three ounces each every three hours was given. The above feeding was retained. The infant gained eight ounces at the end of the first week."—*L. Fischer: Clinical notes in a series of premature infants, Arch. Pediat. 44:227-231, April, 1927.*

In the treatment of decomposition, "As a rule it is best to start with 2 to 2½ or 3 ounces of albumin milk to the pound weight in 24 hours; the sugar to be added is in the form of a maltose-dextrin mixture. One should never delay too long in adding this."—*C. G. Grulee: Infant Feeding, W. B. Saunders Co., Phila., 1922, p. 265.*

With reference to hypotrophy, "In mild cases, the addition of dextrimaltose instead of cane or milk sugar may be sufficient to obtain a gain in weight."—*C. Herrman: The treatment of nutritional disorders in artificially-fed infants, New York M. J. 114:158-160, August, 1921.*

In athrepsia, "The carbohydrates are usually added in a slowly fermentable form, such as the maltose and dextrin compounds, which are usually started by the addition of four grams per kilogram (1/15 ounce per pound) and increased until eight grams or more per kilogram (¼ ounce per pound) of body weight are added."—*J. H. Hess: Feeding and the Nutritional Disorders in Infancy and Childhood, F. A. Davis Co., Phila., 1928, p. 278.*

Concerning the treatment of marasmus, "When the stools have become smooth and salve-like, carbohydrate, in the form of dextrimaltose, may be gradually added up to the limit of tolerance."—*L. W. Hill: Practical Infant Feeding, W. B. Saunders Co., Phila., 1922, p. 281.*

In the feeding of prematures, "As soon as there is a hesitation in the gain in weight, dextrimaltose No. 1 is substituted for the dextrose, in the same amount in the mixture, with almost invariably a gain in weight."—*F. B. Jacobs: Relation of irradiated food substances and ergosterol versus cod liver oil in childhood nutrition, Pennsylvania M. J. 35:164-167, Dec., 1931.*

"A spasmophilic baby on bottle feeding should receive a limited amount of milk—a pint, or at the most 24 ounces in the 24 hours—to which cereal gruel and some form of sugar is added, preferably one of the malt dextrin preparations; also the early addition of other foods than milk to the baby's diet."—*M. Jampolis: Infantile spasmophilia, Interstate M. J. 25:652, Sept., 1918; abst. Arch. Pediat. 35:691, Nov., 1918.*

In cases of malnutrition and indigestion, "The appetite improves rapidly, and the stools soon become normal in appearance, if the sugars are intelligently prescribed. By this I refer to proper proportions of dextrin and maltose. When there is a tendency to looseness, I have used the preparation known as 'dextri-maltose,' for the extra carbohydrates; . . ."—*M. Ladd: Further experience with homogenized olive oil mixtures, Arch. Pediat., 33:501-512, July, 1916.*

In pyloric stenosis, "With low dextrose tolerance, a maltose dextrin preparation may be added in whole or in part. Even where the dextrose is well tolerated and gain in weight has ceased, impetus to the weight ontake may be given by the addition of a maltose dextrin preparation."—*D. J. Levy: Pyloric stenosis and pylorospasm of infancy with especial reference to medical treatment, J. Michigan St. M. S., 21:166-170, April, 1922.*

With reference to the treatment of diarrhea, "After several days, 2% to 3% of a maltose-dextrin preparation may be added (Dextri-Maltose). This is preferable to the easily fermentable lactose or cane sugar."—*F. Lust: The Treatment of Children's Diseases, J. B. Lippincott Co., Phila., 1930, p. 145.*

In dyspepsia, "The carbohydrate must not be allowed to exceed 3 per cent. Dextri-maltose is the most suitable sugar."

In the treatment of decomposition (atrophy, malnutrition, marasmus), ". . . when there has been obvious improvement, dextri-maltose is gradually increased from 3 to 5 per cent."—*B. Myers: The nutritional disturbances of infancy, Brit. M. J., 1:1079-1083, June 21, 1924.*

"The treatment of artificially fed children in the first of these groups consists in putting them on a low fat dietary, and giving them carbohydrate in the form of one of the less fermentable sugars—e.g., dextrimaltose."—*L. G. Parsons: Wasting disorders of early infancy, Lancet, 1:687-694, April 5, 1924.*

In the milder cases of inanition, "Regulation of this disturbed organismal balance is obtained by the addition of carbohydrates, while fat and casein are reduced. For this purpose dextrimaltose and flour are better than the ordinary sugars, since they are more slowly absorbed and have greater efficacy in their powers of controlling the flora in the large intestine."—*W. J. Pearson and W. G. Wyllie: Recent Advances in Diseases of Children, P. Blakiston's Son & Co., Phila., 1930, p. 116.*

In intestinal intoxication, "I have had more experience with dried skimmed milk in which 2 to 5 per cent dextrimaltose, barley or rice flour has been cooked, and the mixture subsequently fermented by lactic acid bacilli or soured with lactic acid, than with any other food except protein milk."—*G. F. Powers: A comprehensive plan of treatment for the so-called intestinal intoxication of infants, Am. J. Dis. Child., 32:232-257, August, 1926.*

Regarding the treatment of the marantic infant, "After the intolerance to sugar has been overcome a carbohydrate, preferably Dextri-maltose, may be added."—*C. S. Raue: Diseases of Children, Boericke & Tafel, Phila., 1922, p. 427.*

In spasmophilia, "Dextri maltose is the best sugar to use in these cases, in the proportion of 6 to 8 per cent."—*J. H. Reading, Jr.: Spasmophilia, Hahneman. Monthly, pp. 403-411, July, 1922.*

In the treatment of atrophy, "If the baby continues to improve, the next step in the treatment is to add to the milk one of the less fermentable carbohydrates, such as dextrimaltose; . . ."—*H. Thursfield and D. Paterson: Diseases of Children, William Wood & Co., 1929, p. 105.*

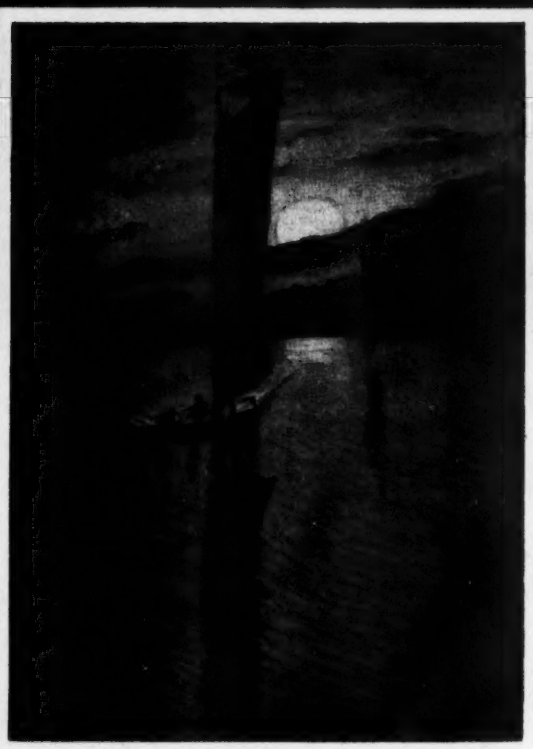
"I also find dextrin-maltose an excellent addition to albumin-milk when the first object of that food has been achieved and a gain in weight is desired; in this way I have succeeded in feeding albumin-milk far beyond the period usually advised, with highly gratifying results."—*F. L. Wachenheim: Infant-Feeding; Its Principles and Practice, Lea & Febiger, Phila., 1915, p. 158.*

"Dextri-maltose has been substituted for lactose not infrequently, when the tolerance for the latter continues low."—*I. H. West: Low fat, high starch evaporated milk feeding for the marasmic baby, Arch. Pediat. 48:189-193, March, 1931.*

"Malt sugar is indicated when others fail to produce a sufficient gain, or when malassimilation of fat is evident."—*O. H. Wilson: The role of carbohydrates in infant feeding, Southern M. J. 11:177, March, 1918; abst. Arch. Pediat. 35:447, July, 1918.*

MEAD JOHNSON & COMPANY, Evansville, Indiana, U.S.A.

Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons



Thou driftest gently down the tides of sleep.—LONGFELLOW

ORTAL SODIUM

The New BARBITURIC HYPNOTIC

Ortal Sodium is accepted for N. N. R. by the Council on Pharmacy and Chemistry of the American Medical Assn.

ORTAL SODIUM—the result of ten years of research in the Parke-Davis laboratories—is an effective rapidly-acting hypnotic; it induces sound, restful sleep, so necessary in a wide variety of physical and mental disorders. Ortal Sodium has low toxicity, and its use is free from unpleasant hang-over effect.

The effective hypnotic dose in most cases is one or two capsules.

Samples to physicians on request.

Supplied in bottles of 25, 100 and 500 3-grain capsules.

Parke, Davis & Co.

DEPENDABLE MEDICATION BASED ON SCIENTIFIC RESEARCH